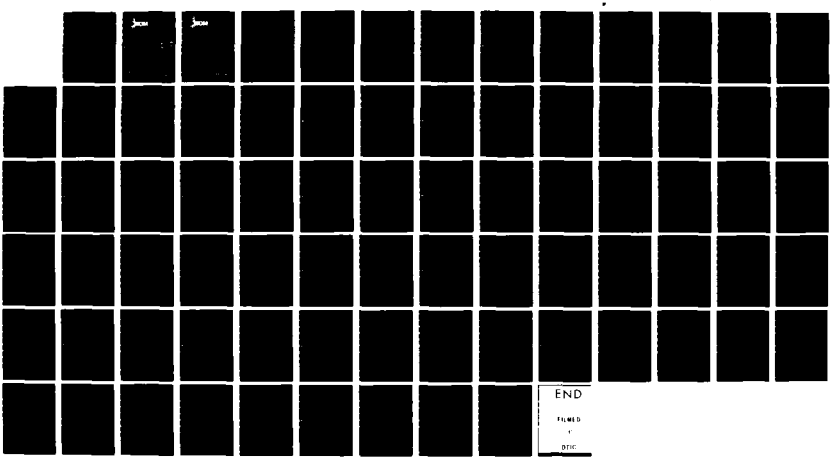
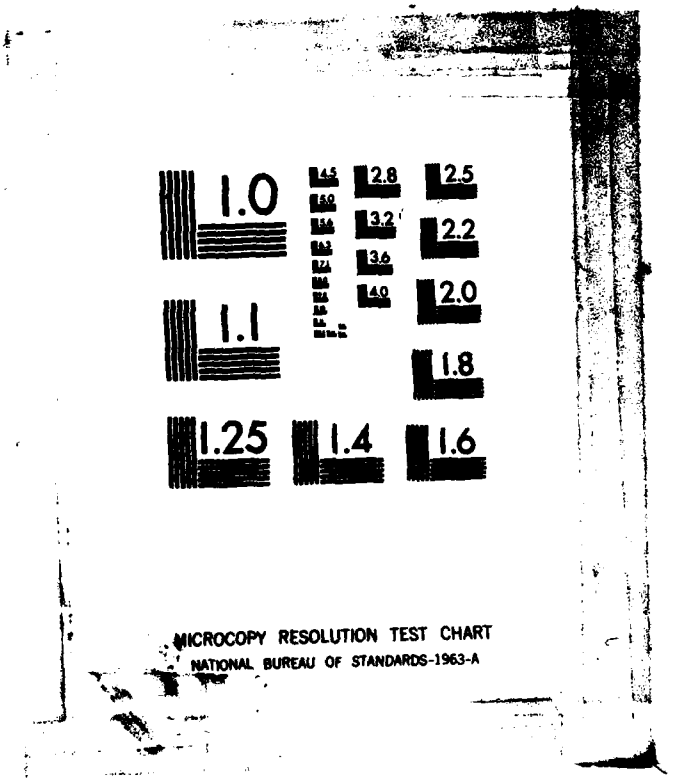
AD-A124 335 INTEGRATED NUCLEAR AND CONVENTIONAL THEATER WARFARE SIMULATION (INWARS) D.. (U) BDM CORP MCLEAN VA J R ALDRICH ET AL. 08 FEB 80 BDM/W-80-047-TR-PT-4-2 1/1

UNCLASSIFIED DAAG39-77-C-0174 F/G 15/7 NL

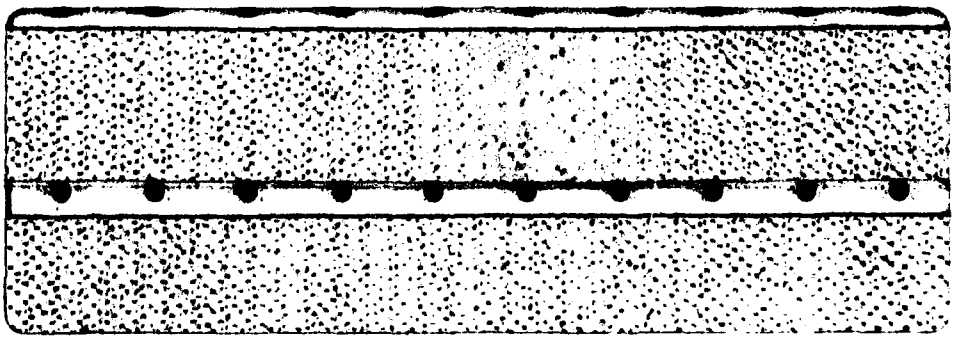



1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

FEB 80 VERSION

AD A124335

THE BDM CORPORATION



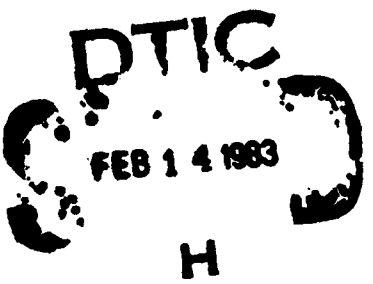
DTIC FILE COPY

83 02 010 017

7915 Jones Branch Drive
McLean, Virginia 22102
Phone (703) 821-5000

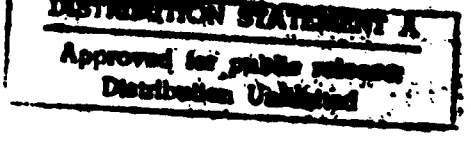
February 8, 1980

BDM/W-80-047-TR



INTEGRATED NUCLEAR AND CONVENTIONAL THEATER WARFARE SIMULATION (INWARS) DOCUMENTATION PART IV USER'S MANUAL COMPONENT VOLUME II: COMBAT INTERACTIONS INPUT

SDW/00102



UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE	READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO. AD-A124335	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Final-Integrated Nuclear and Conventional Theater Warfare Simulation (INWARS). Final Report-Part IV, Volume II	5. TYPE OF REPORT & PERIOD COVERED User's Manual
	6. PERFORMING ORG. REPORT NUMBER BDM/W-80-047-TR
7. AUTHOR(s) Dr. J.R. Aldrich, J.B. Gilmer	8. CONTRACT OR GRANT NUMBER(s) DAAG39-77-C-0174
9. PERFORMING ORGANIZATION NAME AND ADDRESS The BDM Corporation, 7915 Jones Branch Drive, McLean, VA 22101	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS HQ DA, (DAMO-ZD), The Pentagon, Room 3A546, Washington, D.C. 20310	12. REPORT DATE February 8, 1980
	13. NUMBER OF PAGES 70
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)	15. SECURITY CLASS. (of this report) Unclassified
	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Unlimited

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

Unlimited

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Theater Simulation
Command-Control-Intelligence
Combat Interactions

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This manual provides user documentation on the INWARS simulation.

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

FOREWORD

This is Volume II of the User's Manual Component of the Integrated Nuclear and Conventional Theater Warfare Simulation (INWARS) documentation. It presents the content and format of user inputs to the INWARS treatment of combat interactions.

PART I - INWARS SYNOPSIS

PART II - MODELING DESCRIPTION

- VOL. I INTRODUCTION
- VOL. II GROUND COMBAT OPERATIONS
- VOL. III AIR OPERATIONS
- VOL. IV COMBAT SUPPORT OPERATIONS
- VOL. V ECHELON ABOVE DIVISION COMMAND, CONTROL, AND INTELLIGENCE (EAD C^2I) ACTIVITIES

PART III - SOFTWARE DESCRIPTION

- VOL. I SOFTWARE FRAMEWORK
- VOL. II EAD C^2I DATA STRUCTURES
- VOL. III EAD C^2I PROCEDURES
- VOL. IV INFORMATION COLLECTION AND COMMUNICATION DATA STRUCTURES AND PROCEDURES
- VOL. V COMBAT INTERACTIONS DATA STRUCTURES
- VOL. VI COMBAT INTERACTIONS PROCEDURES

PART IV - USER'S MANUAL

- VOL. I INTRODUCTION
- VOL. II COMBAT INTERACTIONS INPUTS
- VOL. III EAD C^2I INPUTS
- VOL. IV INWARS OUTPUTS

TABLE OF CONTENTS

COMBAT INTERACTIONS INPUT SPECIFICATIONS

LIST OF FIGURES

LIST OF TABLES

INPUT SPECIFICATIONS

A. GENERAL COMMENTS

This volume specifies the inputs to the Combat Interactions portion of the INWARS model. This software may be run either in a stand alone mode, or as part of the integrated INWARS model. In the latter case, the run control cards given in Section A are omitted.

The function of the inputs are to initialize various data structures which define operations weapons, terrain, units, and other aspects of the model. Thus, the inputs are organized by the data structure initialized. The data structure definitions are given in "INWARS CIS DATA STRUCTURES" in sections shown by Table 1, for the respective sections of this volume.

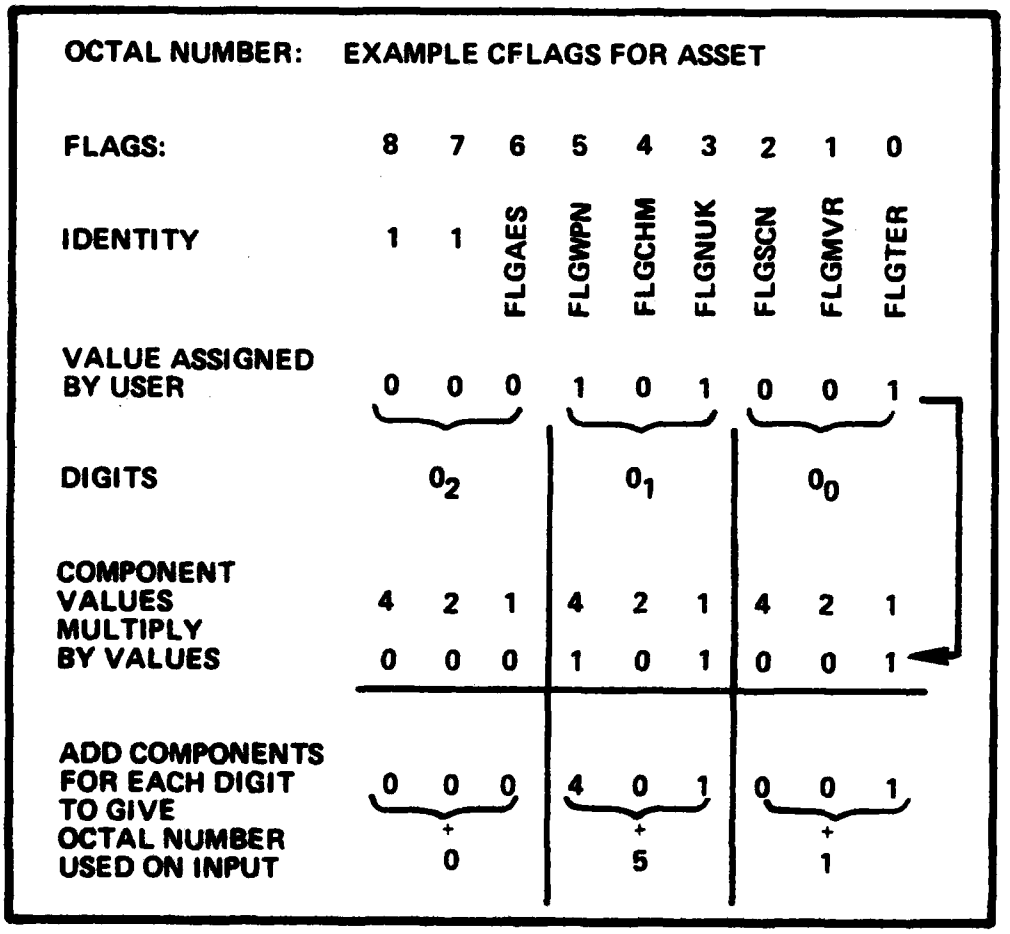
Since the inputs are primarily used to load data structures, the acceptable range for numbers depends on the space, or number of bits, allocated to the particular field in the data structured definition. The minimum value for almost all inputs is zero; blank or negative entries will usually cause catastrophic software failure. Most "factors" in the model are stored in nine bits, with a maximum input value of 7.99 in floating point formats or 799 (%) in integer formatted fields. Larger values will probably cause software errors, except where the data specifications in this volume say otherwise.

One type of data used throughout the CIS data structures is the "flag." This type of information is normally stored in one bit, and is used to enable or indicate a particular feature. Examples are flags which indicate that a weapon is nuclear, or that it is subject to air attack. These flags are put in octal format, with each digit of the octal number representing three flags, as shown in Figure 1.

When floating point format is specified, such as with F5.2, the first number indicates the total number of card columns used, and the second indicates the number of card columns following the decimal point. Thus, for the F5.2 format, the first two columns would be the integer portion of the number, the third column a decimal, followed by the fractional value in the last two columns.

TABLE 1. DEBUG FLAGS

BIT	DECIMAL	SUBROUTINE	USE
0	1	PERCEV	PERCEPTION, ENTRY POINT
1	2	PERCEV	PERCEPTION, LOOP FOR ALL PERCEPTIONS
2	4	PERCEV	PERCEPTION, EXIT POINT
3	8	COMBAT	COMBAT PROCESS; THIS CAUSES A LOT OF OUTPUT
4	16	CONTNG	CONTINGENCY RECOGNIATION PROCESS, ORS
5	32	BGSGO	OPERATION REACTION SYSTEM
6	64	GETHX	GET HEX UTILITY
7	128	GETHX2	GET HEX UTILITY, EXIT
8	256	GETHX2	GET HEX UTILITY, LOOP (LOTS OF OUTPUT)
9	512	-	NOT USED
10	1024	-	NOT USED
11	2048	GIMME, RELEASE	ALLOCATION AND RETURN OF DYNAMICALLY ALLOCATED MEMORY ARRAY SPACE
12	4096	GUBEDR	TRACES ENTRY AND EXIT OF MAJOR SUBROUTINES
13	8192	EVALST	EVALUATE ENTITY STRENGTH
14	16384	DISPOSE DISPOP	DISPOSE OF OLD OPERATION ORDER POP OPORDER STACK
15	32768	SITCVT	SITUATION CONVERSION OF CODE (ORS)
16	65536	GENOBJ	GENERATE OBJECTIVE
17	131072	-	NOT USED
18	262144	DIVPLN	DIVISION PLANNING PROCESS
19	524288	DORDER	DETAIL TEMPLATE ORDER PROCEDURE
20	1048576	HORIEN	HEX ORIENTATION UTILITY
21	2097152	RECOV	RECOVERY FROM SUPPRESSION EFFECTS
22	4194304	SCORMV	MOVEMENT SECTION, SPEED, AND PROCESS
23	8388608	DAMAGE	EQUIPMENT DAMAGE
24	16777216	EVALU8	SITUATION FEATURE AGGREGATION
25	33554432	RECSGO	RECEPTION OF SUPPLY REQUESTS
26	67108864	HXMOV	MOVEMENT WITHIN HEX TREE
27		ABCOPS	AIR BASE CLUSTER OPERATIONS
28		BDEACT	ENTITY OPERATIONS SUPERVISOR
29		GSARTY GSARTS	GENERAL SUPPORT ARTILLERY AND SUPPORT REQUEST PROCESSES
30		RECARQ	RECEPTION OF AIR REQUESTS BY ABC
31		CREATE	ENTITY CREATION
32		PURGEN	ENTITY PURSE
33		GETTPU	GET TEMPLATE RELATION UNIT UTILITY
34		TRANSA	TRANSFER ASSETS UTILITY
35		EXTSUP	EXTERNAL SUPPLY ECHO



SOW/00802

Figure 1. Octal Number Use

B. RUN CONTROL AND DIAGNOSTIC FEATURES

The cards described here are at the start of each INWARS CIS input deck. They are omitted when the CIS input is used as part of the complete INWARS model input.

Card 1: Run Control

Inputs: ICON (A4) Input Control:

(columns 10-13)	NEWb	If new data input
	OLDb	If old data from ISPACE

Note: Use NEW for input processor, OLD for model

RCON (A4) Run Control:

(columns 14-17)	RUNb	If run division planning, then combat model
	BDEb	To run only the combat model, no division planning
	(Blank)	Input only

Note: Use RUN or BDE only for model, not input processor.

CYCLES (I5) Specifies the number of combat cycles (Columns 19-23) for the model

EFLG (A4) Save Flag:

(Columns 25-29)	SAVE:	At end of run, ISPACE is saved on device 9

Card 2: Echo Control

Format: 7X, 2A4

Inputs: ECH (A4) Echo Enable

(columns 8-11)	YESb	If input echo required
	bNOb	If no input echo desired

OPT (A4) Option Specification

(columns 12-15)	ALLb	For echo of all inputs
	SRCH	Search tables
	NCRD	Nuclear/chemical readiness data

ORST	ORS tables
OPDT	Operations data
TABS	Includes Search, N/C readiness, ORS, Operations, and Asset Data
HEXS	Hex data
ENTY	Entity data

Notes:
1. This card is omitted if "OLD" is specified for ICON on Card 1.
2. The option specification allows restriction of echo to only part of the input data.

Card 3: Dump Control

Format: 7X, A4

Input: DCON (A4) Input Diangostic Control

(columns 6-19) YESb	Activates diagnostic writes in GUBEDR, GETHX, GETHX2, GIMME subroutines
bNOb	No diagnostics on input

Card 5: Model Run Diagnostic Control

Format: 3X, O12 (columns 4-15)

This octal number is a series of 36 flags which selectively enable various debug writes in the CIS software. Table 1 identifies the bits.

Card 6: Diagnostic Data Structure Dump Control

Format: 3X, O12 (columns 4-15)

This octal number is a series of 36 flags which govern the operation of the DSDUMP subroutine. This routine dumps selected data structure at the completion of the run. Table 2 identifies the bit.

Note: In the input descriptions, the smaller letter b indicates a blank in the A4 format.

TABLE 2. DATA STRUCTURE DUMP CONTROL FLAGS

BIT	DECIMAL	USE
0	1	ENTITIES
1	2	OPERATION ORDERS (BIT 0 MUST ALSO BE ON)
2	4	HEXES AND OCCUPANCY BLOCKS
3	8	ASSET DESCRIPTORS
4	16	OPERATION DESCRIPTORS
5	32	CONTINGENCY TABLE
6	64	SEARCH TABLES
7	128	TARGET LIST
8	256	OPERATION EFFECTS TABLE (BIT 4 MUST ALSO BE ON)
9	512	COMBAT EFFECTS TABLES
10	1024	ISPACE DUMP (USES SUBROUTINE FSDUMP)
11	2048	ORS TABLES (DOES NOT WORK)
12	4096	TYPE DESCRIPTOR BLOCKS
13	8192	NUCLEAR/CHEMICAL READINESS TABLES
	16384	SUPPLY STRUCTURES (BIT 0 MUST ALSO BE ON)

NOTE - Failure to include the echo control card will cause the program to abort due to a fatal loader error.

C. INFORMATION DEGRADATION DATA

This data defines the extent to which information collected about enemy force elements is degraded by loss of qualitative information element or quantitative precision. Its role is described in the Modeling Description Volume IV, Chapter II. Information degradation is organized by side (NATO vs Warsaw Pact) and, within side, by 20 milometer "range bands" around the collecting force element (10 such range bands are permitted). The Information Degradation Input Deck thus consists of 20 Degradation Data Sets, one for each side and range band. The organization of the deck is suggested in Figure 2.

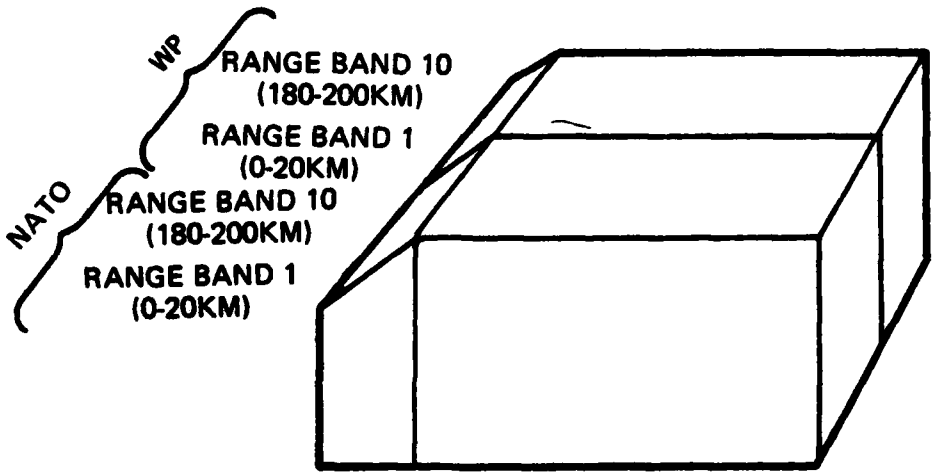
This data is read only in the complete INWARS model version, and preceeds all other inputs described in this volume. It is not read in the case of the test version of the combat interactive software. Thus, either the cards described in Section B or these cards are included depending on application.

Each Information Degradation Data Set consists of: (1) a set of flags indicating whether or not associated information element can be collected; and, (2) a set of measurement unit expressing the precision with which associated information elements can be collected. Each such data set is specified on a single card as will now be described.

Format Specification: 8I1, I2, 3I3, I6, 2I3.

Input Variables

DGNATF (I1) (Column 1)	=	Flag indicating whether or not Nationality information is degraded (1 = degraded)
DGSVCF (I1) (Column 2)	=	Flag indicating whether or not source information (i.e., air versus ground) is degraded (1 = degraded)



79W/00036

Figure 2. Information Degradation Input Deck

DGTYPE (I1) = (Column 3)	Flag indicating whether or not type information (e.g., combat versus combat support) is degraded (1 = degraded)
DGFCNF (I1) = (Column 4)	Flag indication whether or not Function information is degraded (1 = degraded; not used at present).
DGNRYF (I1) = (Column 5)	Flag indicating whether or not nuclear readiness information is degraded (1 = degraded)
DGCRYF (I1) = (Column 6)	Flag indicating whether or not Chemical Readiness information is degraded (1 = degraded).
DGMSNF (I1) = (Column 7)	Flag indicating whether or not mission information is degraded (1 = degraded).
DGOPNF (I1) = (Column 8)	Flag indicating whether or not Operation information is degraded (1 = degraded).
LOCDEG (I2) = (Columns 9-10)	Hex level to which Location information can be known (0-6)
AXDEG (I3) = (Columns 11-13)	Nearest number of degrees to which axis of operation information can be known (0-360 degrees)
SECDEG (I3) = (Columns 14-16)	Nearest number of kilometers to which Sector Width information can be known (0-51 kilometers)
SPDDEG (I3) = (Columns 17-19)	Nearest number of kilometers/hour to which Speed information can be known (0-128 km/hour)
STRDEG (I6) = (Columns 20-25)	Nearest number of standard strength unit (e.g., tank equivalents, etc.) to which Strength information can be known (0-262K strength units)
CAPDEG (I3) = (Columns 26-28)	Nearest number of suppression index units to which Capability/Suppression information can be known to (0-512 suppression index units)
ACQDEG (I3) =	Fraction of a large scale unit which may be "acquired" for targeting purposes (0-100 percentage points)

D. TERRAIN EFFECTS AND SEARCH DATA

1. Terrain Effects Data

Immediately preceeding the search pattern data are three cards which allow the user to specify terrain effects on speed, cover, and obscuration respectively. The first eight values on eac card is for terrain types zero to seven. The remaining five are for the two types of artificial barrier hexes, rivers, and the two types of barrier hex sides. These last five values are omitted on the last card (obscuration).

a. Card 1: Terrain speed effects

FORMAT: 1315
TERSPD (I)
I=1, 13
(columns 1-5,6-10, 11-15, 1620, etc.)

Terrain speed degradation, as a modification to normal speed for a given operation. A value of zero causes no effect, a maximum value of 64 is used to give complete degradation.

b. Card 2: Terrain cover effects

FORMAT: 1315
TERTAB (I)
I=1, 13
(columns 1-5, 6-10, 11-15, 16-20, etc.

Terrain cover given as the number of targets of an enemy unit in the hex which would result in a 50% probability of target acquisition (LOS) to some target for the average weapon, for each type of terrain. The value for the basic terrain type in a given hex. This factor is intended to give the ability of targets to take advantage of micro terrain cover in the hex.

c. Card 3: Terrain Obscuration

FORMAT: 815
MVALU (I)
I=1, 8
(columns 1-5, 6-10, 11-15, 16-20

Terrain obscuration is intended to give the effect of limited line of site due to macro terrain features such as landform and forest. The effect depends on the disposition of the unit. The value for

a terrain type is the minimum exponent to which the disposition is raised to give the proportion of effective weapons. This is applied to direct five weapons. The maximum exponent is a reflection of the rage capability of the weapon. Use zero for artillery and other indirect fire weapons.

2. Search Patterns:

The data which described the search patterns is organized by search class and sector width. The initial card gives the number of search classes. Each class is headed by a card giving the number of search patterns in that class. The actual cards which define the search pattern follow, headed by a card specifying the number of search vectors in the pattern and the sector width. The Search Data Deck is illustrated in Figure 3.

3. Search Deck Header Card

Format Specification: 10X, I5

Input Variable: NSRCHS(I5) = Number of search classes
(Columns 11-15)

4. Search Class Header Card

Format Specification: I5

Input Variable: NSRCS(I5) = Number of search patterns in class
(Columns 1-5)

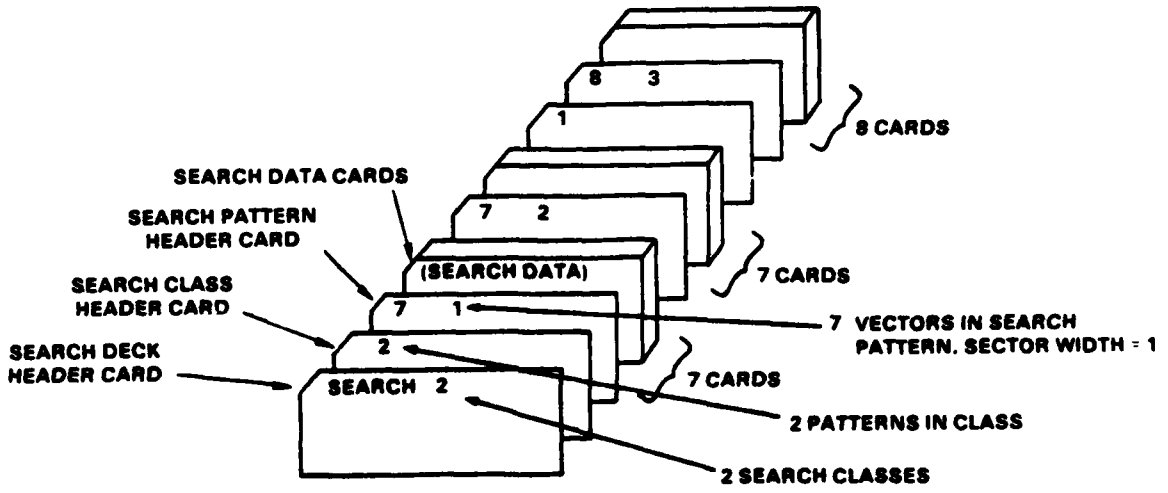
5. Search Pattern Header Card

Format Specification: 3I5

Input Variables:

NHEXES(I5) = Number of hex vectors in search
(Columns 1-5)

SECTOR(I5) = Sector width for which this search pattern is
(Columns 6-10) defined



80W/00102

Figure 3. Search Data Deck

TGTLIM(I5) = (Columns 11-15) Number of target units which can be simultaneously acquired or engaged by a unit using this search pattern. If zero, there is no limit.

6. Search Data Cards

Format Specification: 2X, 03, 3I5, 4F5.2, 2(4X, 01), 2X, 03

Input Variables:

HSVECT(03) = Search vector (in hex, value $\geq$ 0)
(Columns 3-5)

HXLEV(I5) = Level of search above base level
(Columns 6-10)

RANGE(I5) = Range of search from searching unit (zero for hexes occupied by the unit).
(Columns 11-15)

FLNDX(I5) = Flank index indicating side
(COLUMNS 16-20)
1 = left flank
2 = right flank
0 = no flank effects.

COEF1(F5.2) = Threat coefficient for enemy force in hex. Normal value is one for vector 7.
(Columns 21-25)

COEF2(F5.2) = Flank threat coefficient for enemy force in hex. Normal value is one for vectors 2 or 4.
(Columns 26-30)

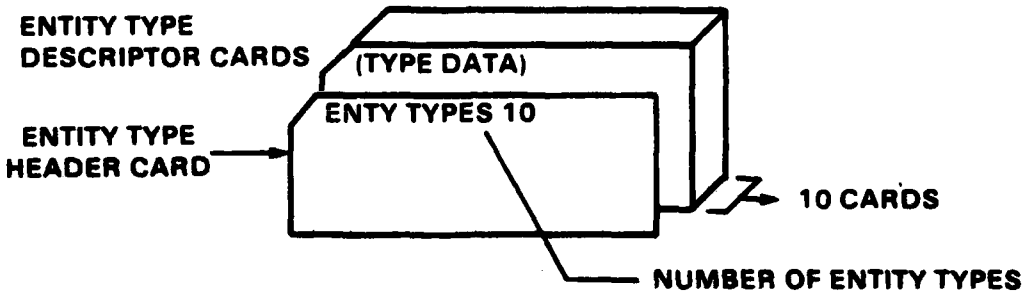
COEF3(F5.2) = Allocation factor against enemy units in the hex. Normal value is one for vector 7.
(Columns 31-35)

COEF4(F5.2) = Force distribution fraction. All COEF4 factors in the search pattern should sum to one; COEF4 should be zero if RANGE > 0.
(Columns 36-40)

DIR1 (01) = Direction for which threat evaluation is doubled.
(Column 45)

DIR2 (01) = Direction for which flank evaluation is doubled.
(Column 50)

ENGFGS(03) = Engagement mode flags: A binary bit is set



BDW/00802

Figure 4. Entity Type Descriptor Deck

(Columns 53-55) in this octal field to indicate which engagement modes the searching unit may use to engage targets in the hex. These flags are:

Bit	Engagement Mode
(lsb) 0	Counter-Command/Control
1	Indirect Fire
2	Direct Fire
3	Anti-Air Defense
4	Anti-Air
5	Counter Fire
6	Counter Logistics
7-8	Unassigned

7. Notes on Input Data Limits, Effects, and Anomalies

All input data elements having a floating point format must have values between 0 and 7.99. Negative numbers or blank entries for any of the variables will cause errors or model failure during execution. A zero value should not be used for HSVECT; a value of 7 is used for the "own hex" search. A value of zero for DIR1 or DIR2 will nullify the direction of movement considerations. A zero for FLNDX causes flank considerations to be nulled. FLNDX should be less than 3.

E. ENTITY TYPE DESCRIPTOR DATA

The type descriptor data is commonly used by all entities of a given type. The types of entities thus distinguished can be given different operations classes, nuclear readiness posture effects, and different Operation Reaction System tables. Figure 4 illustrates the makeup of this input deck.

1. Entity Type Deck Header

Format Specification: 10X, I5

Input Variable: NTYPES(I5) = Number of entity types (Columns 11-15)

2. Type Descriptor Data Cards

Format Specification: I5, 4X, A6, 3X, 02, 1X, 04, 2(2X, 03), 4X, 01, I5

Input Variables:

TYPE(I5) (Columns 1-5) = Type index (1 to 31)

NAME(A6) (Columns 10-15) = Alpha description of specified type

UNICAT(02) (Columns 19-20) = Unit category used in C^2I processing. (Not used by supply).

TFLAGS(04) (Columns 22-25) = Type flags as follows:

	Bit	Identity	
(lsb)	0-4	-	Undefined
	5	FLGMVC	Move consideration: 0 = normal method 1 = direction to objective only
	6	FLGTER	Terrain effects. If zero, unit gets no terrain cover benefit during combat processes.
	7	FLGSL	Shoots last on interim combat during multi-hex movement
	8	FLGSF	Shoots first on interim combat during multi-hex movement
	9	-	Undefined
	10	FLGMCB	Indicates combat during movement on hex moves
(msb)	11	FLGMCR	Indicate unit receives fire during multiple hex moves

UNENGR(03) (Columns 28-30) Unit engagement rule flags: A flag is set for each engagement made which the entity may employ:

	Bit	Engagement Mode
(lsb)	0	Counter-Command/Control
	1	Indirect Fire
	2	Direct Fire
	3	Anti-Air Defense
	4	Anti-Air
	5	Counter Fire
	6	Counter-logistics
	7-8	Unassigned

UNVULR(03) (Columns 32-35) — Unit vulnerability rule flags: These flags indicate the engagement modes by which an entity of this type may be engaged. The bit definitions correspond to those listed for UNENGR above.

FLNTEL(01) (Column 40) — Flags available for the control of intelligence acquisition process. (Unused).

TGTCAT(I5) (Columns 41-45) — Target Category and Unit Category for C^2I purposes. Assigned from list below. These are inserted into the data structure elements which are also defined as STKLOC and STKTR.

UNICAT(I5) (Columns 46-50)

Type	Description	TGCAT	UNICAT
1	EAD HQ	2	23
2	DIV HQ	1	1
3	GND	0	1
4	LOG	5	25
5	N/C DELIV	3	15
6	ABC	4	41
7	AMP	0	33
Others	-	0	0

STKSUP, STKOPS (Columns 61-65, 66-70)	Stock levels for intelligence acquisition by an entity of this type. (Value = 0 to 511) Not used.
SRCTYP(I5) (Columns 71-75)	Identifies the type of search/perception pattern used by the unit. If it is zero, the search/ perception pattern is a function of operation.
NTELEV(I5) (Columns 76-80)	Indicates the proportion of the perception of the situation that depends on subordinate unit reports (for division HQ only).

3. Unit Type Limits

These six cards are used to define the type numbers associated with units which undergo special processing. On each card is a maximum and minimum type number which will result in recognition as a unit at that type.

1) Card 1: Echelon Above Division Types:
   FORMAT: 215
   EADTYP, EADTYH (columns 1-5, 6-10, EAD unit types. Both values must be 1.
2) Card 2: Division Headquarters types:
   FORMAT: 215
   TDIVHQ, TDIVHH (columns 1-5, 6-10) Division headquarters types. Both values must be 2.
3) Card 3: Maneuver Unit types
   FORMAT: 215
   GNDMV, GNDMVH (columns 1-5, 6-10) Ground maneuver unit types. Both values normally 3.
4) Card 4: Logistics Unit Types
   FORMAT: 215
   TLOG, TLOGH (columns 1-5, 6-10) Logistics unit types. Both values normally 4
5) Card 5: Airbase Cluster Types
   FORMAT: 215

TABC, TABCH (columns 1-5, 6-10) — ABC unit types. Both values normally 6

6) Card 6: Nuclear/Chemical Delivery Entitles

FORMAT: 2I5

TNCDE, TNCDEH (columns 1-5, 6-10) — N/C Delivery Entity types. Both normally 5

F. WEAPON/ASSET CHARACTERISTICS DATA - (INTABS)

This data defines the characteristics of all the various assets which may be attached to entities in the model. This information is stored in the Asset Descriptor Blocks and associated combat effects tables. Section 3 of "INWARS Combat Interactions Data Structures" provides additional information.

The Input Deck includes a header card which specifies the number of different assets which will be defined, the number of target types, and the resolution to be used for each target type. This is followed by a series of card sets describing each asset. Figure 5 illustrates.

1. Asset Data Header Card

Format Specification: 10X, 2I5, 10F6.2/20X, 10F6.2

Input Variables:

NASSET(I5) (Columns 11-15)	Number of assets described
NTGTYP(I5) (Columns 16-20)	Number of targets types
TGTRAD(I)(F6.2) (Columns 21-26, 27-32, 33-38, 39-44, etc.)	Array which gives the resolution used for each target type. For example, .25 indicates that each 4 integer steps is one individual. Note that there is a limit on the maximum integer value which can be put in the asset list. Thus, if the maximum integer value is 511 (as it is for 2 or 3 assets per asset item structure),

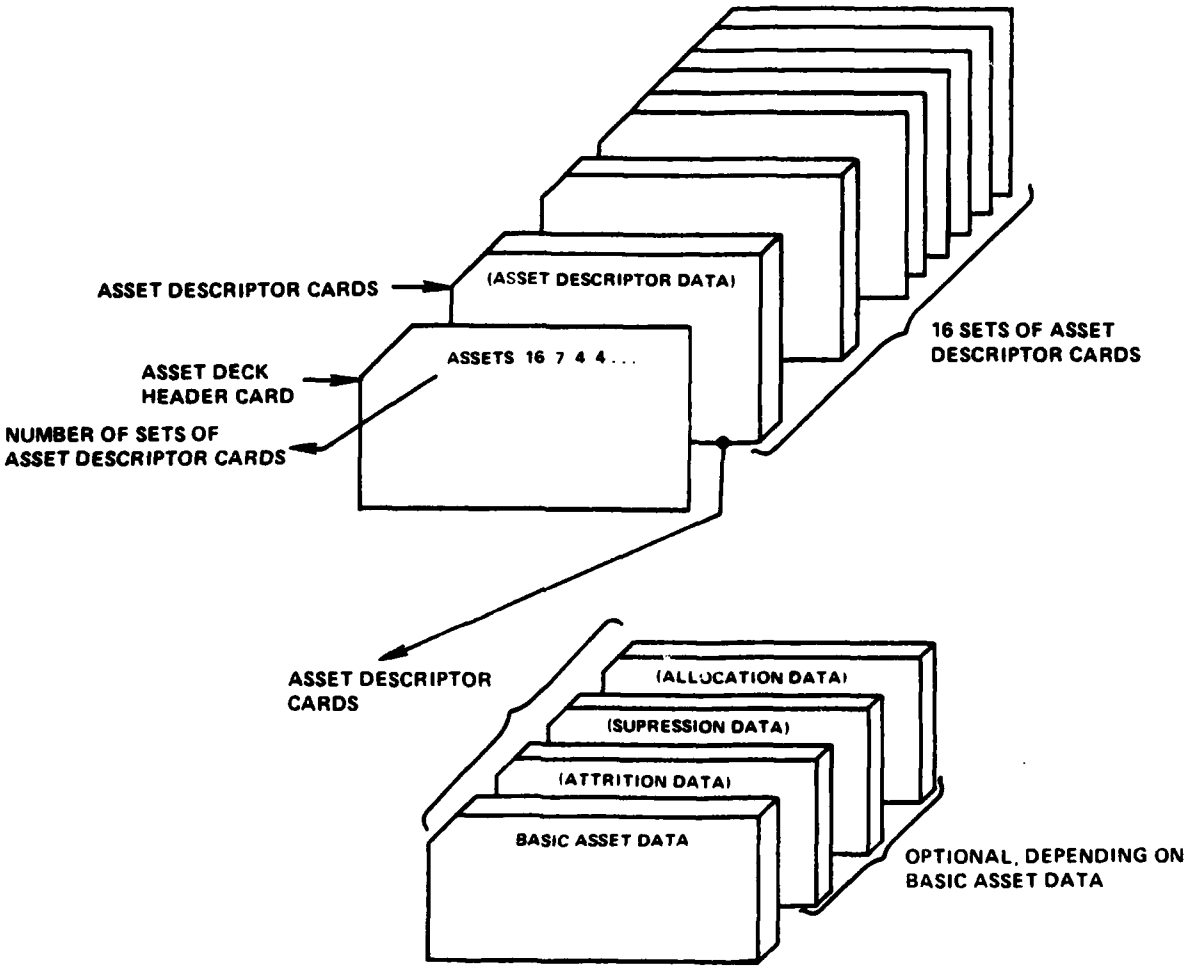


Figure 5. Asset Data

and if a unit may have up to, but no more than, 127 tanks, then tanks must have a target class with a value TGTRAD of .25 or greater.

Note that for NTGTYP - $\geq$ 10, two cards are used. Provision is made for 20 target types.

2. Asset Descriptor Basic Data

This data is on a series of cards which will be listed separately.

a. Card 1

Format Specification: I5, 4X, A6, 2I5, 2X, 03, I5, 2(2X, 03), 5I5

Variable Inputs:

TYPE(I5) (Columns 1-5)	Asset type identifier (1 to ASTYPM). The maximum value allowed depends on the form of the asset list and is put in as the variable ASTYPM during compilation. Normally it will be 511 for INWARS. Reserved types· 60 = Supply capacity 61 = Repair capacity 59 = Supplies 63 = Air base capacity
NAME(A6) (Columns 10-15)	Alpha description of asset.
CATEGR(I5) (Columns 16-20)	This gives the category of which the asset type is a member. Typical categories might be for tanks, APC's, suppliers, etc. This value must be less than 63. The classes may be assigned as equal to target type (defined later) as the simplest alternative.
NXOPS(I5) (Columns 21-25)	This operations index specified the class of operations for which this asset can act as a weapon. A zero indicates it may

act as a weapon regardless of the operation class of the unit to which it is attached. NXOPS must be 7 or less, but may be no greater than the number of classes for which data is provided.

CFLAGS(03) (Columns 28-30) — These flags define certain asset characteristics as follows:

Bit	Identity	Description
0 (lsb)	FLGTER	Terrain Flag: If 1, indicates that the weapon is affected by terrain.
1	FLGMVR	Indicates that combat results are reduced if a target unit is moving faster than 1 hex per interval, reducing engagement time.
2	FLGSCN	Indicates target list scan direction. 0 for all except counter-air weapons.
3	FLGNUK	Nuclear weapon
4	FLGCHM	Chemical weapon
5	FLGWPN	Indicates the asset is a weapon.
6	FLGAES	Indicates supply consumption depends on suppression as well as attrition.
7, 8		Undefined

NTGTS(I5) (Columns 31-35) — This indicates the number of target types for which combat parameters are defined. Values are given for types one to NTGTS, even though a weapon may be unable to engage one of those types. NTGTS must be no greater than the number of target classes.

WPENGR(03) (Columns 38-40) — Weapon engagement mode flags. These indicate the manner in which a weapon may be used. For a weapon to be used, there must be a corresponding bit set in its

unit, the operation engagement mode flags, and the vulnerability flags of the target unit and asset.

Bit	Engagement Mode
0 (lsb)	Counter-command/Control
1	Indirect Fire
2	Direct Fire
3	Anti-Air Defense
4	Anti-Aircraft
5	Counterfire
6	Anti-Logistics
7, 8	Undefined

WPVULR(03) (Columns 42-45) — Asset vulnerability flags. These indicate the engagement modes by which the asset may be engaged. The flags correspond to those for WPENGR above.

RANGE(I5) (Columns 46-50) — Range of the asset in hexes. (Zero for direct fire weapons in INWARS.)

TGTTYP(I5) (Column 51-55) — Target type - Identifies the target class to which this asset belongs.

The target types currently in use are:

(1) Hard targets (tanks)
(2) Medium armor (APCs)
(3) Unarmored or light armor
(4) Artillery
(5) Air defense
(6) Helicopters
(7) Aircraft
(8) Supply and Logistics
(9) Nuclear and Chemical weapons

RNGFAC(I5) (Columns 56-60) — This value gives a percentage effectiveness modification which is applied to any engagements at range other than zero. It is

percent with a value of 100 causing no modification. The maximum value allowed is 799.

EFFNDX(I5) (Columns 61-65) — This effectiveness index gives the relative contribution of this asset to unit strength and effectiveness. It must be chosen so that the total strength of a unit is no more than the integer value 511. This is the weighting factor W_i in the strength evaluation formula:

$$STR = \sum_{i=1}^{NASSET} W_i N_i$$

where STR = unit strength ($\leq$ 511 limit)
N = integer number of assets of type i in unit (actual number of assets divided by the value in TGTRAD for its target type).

NTABS(I5) (Columns 66-70) — Number of tables. This value, 0 to 3, specifies the number of tables associated with the asset. If zero, then there are no combat effects tables. If NTABS is 1, the weapon inflicts attrition only, in accordance with an attrition table. If NTABS is 2, a suppression effects table is also used. If NTABS is 3, then attrition, suppression, and allocation tables are used.

b. Card 2

Format Specification: 8I5

Variable Inputs:

MVULN (I-5) — Marginal vulnerability of the asset to

(Columns 1-5)	attrition, compared to others of the same target class. In percent, with a value of 100 normal.
SVULN (I5) (Columns 6-10)	Marginal suppression vulnerability (similar to MVULN).
NVULN (I5) (Columns 11-15)	Marginal vulnerability to nuclear weapons effects.
CVULN (I5) (Columns 16-20)	Marginal vulnerability to chemical weapons effects.
NUCEFF (I5) (Columns 21-25)	Nuclear readiness effect, indicates the extent to which the nuclear readiness posture modifies the effects of enemy nuclear attack on the asset.
CHMEFF (I5) (Columns 26-30)	As NUCEFF, but for chemical attack.
NCEFF (I5) (Columns 31-35)	Nuclear/Chemical readiness degradation effect; indicates the extent to which the weapon's capabilities are degraded by the readiness state.
SRECOV (I5) (Columns 36-40)	Suppression recovery rate; specifies the amount or percentage of suppression on the asset which decays away each interval.

Note: All of the above are in units of % with a value of 100 "normal" (except for SRECOV, 100 implies complete recovery). All variables must be less than 799.

c. Card 3

Format Specification: 6I5, 3X, 012

Variable Inputs:

TEREFF(I5) (Columns 1-5)	Terrain effects index. Indicates the extent to which the asset can take advantage of terrain for cover. Normally 100 (in percent). Maximum value is 799.
TEREFS(I5)	Target terrain utilization modifier.

(Columns 6-10)	This percentage value modifies the target asset's value of TEREFF. Use 100 for null modification, zero if the target gets no terrain benefit. Maximum value is 799.
WPEXP(I5) (Columns 11-15)	Weapon exponent. The combat effects a weapon inflicts is proportional to the number of weapons raised to this power. It is in 100ths, so that a value of 100 is the normal "one" exponent. This would be less than one for certain cases only (such as nuclear and chemical weapons) where effects are very nonlinear.
WPDISF(I5) (Columns 16-20)	This disposition factor is the extent to which the disposition of the unit affects the number of weapons actually able to fire. The unit disposition is raised to the WPDISF power to obtain a combat modification factor. Maximum value is 63.
APROP(I5) (Columns 21-25)	This specifies the proportion of allocation of fire which is based on attrition rather than suppression. It should be between 0 and 100.
SPEED(I5) (Columns 26-30)	Maximum speed of the asset in idealized (or best normal) conditions. In units of km/hr.
SITUAT(O12) (Columns 34-45)	This data element is a set of situation flags which are OR'ed into the situation description word of a unit being attacked. It is primarily used to indicate immediate victim of a chemical, nuclear, or air attack for which it is set to 4000, 10000, or 1000000 octal respectively.

d. Card 4

Format Specification: 8I5

Input Variables:

SUPTYP(I5) (Columns 1-5)	Supply type. This is the asset type of an ammunition asset which is expended during combat. It if is zero or the unit has no asset item labled with this type, supply effects are neglected.
SUPRAT(I5) (Columns 6-10)	Supply expenditure rate. This is the amount of supplies expended per suppression or attrition unit inflicted. The value is in units of 1/100ths and must take into account the integer values of the targets.
SUPLEV(I5) (Columns 11-15)	This is the supply asset level at which the asset becomes degraded in units of integer values of the supply asset.
SUPDEG(I5) (Columns 16-20)	Supply degradation factor. When the supply level is below that specified by the quantity SUPLEV, the unit degradation is proportional to the percentage shortfall multiplied by this factor. If it is 100, degradation is proportional to the shortage. Maximum value is 799. If zero, there is no degradation.
DEPTP1(I5) (Columns 21-25)	Dependent target type 1. This value, if nonzero, specifies another type of asset which is to suffer combat results in association with the primary (direct) target asset. This would normally be used for supplies, personnel, or nuclear devices.
DEPRT1(I5)	Dependent target rate for DEPTP1. This

(Columns 26-30)	value is a scaling factor for combat results. The attrition and suppression inflicted on the dependent type are computed from the combat results on the primary target asset by multiplying by this factor. It is given in percent so that a value of 100 causes equal results. Maximum value is 799.
DEPTP2(I5)	Similar to DEPTYP1. Allows a second
(Columns 31-35)	dependent target type to be specified.
DEPRT2(I5)	Dependent target rate for DEPTP2.
(Columns 36-40)	

e. Card 5

Format Specification: 8I5

Input Variables:

NCTLEV(I5)	Nuclear/chemical contamination level.
(Columns 1-5)	If the weapon is nuclear or chemical, this gives the level of contamination to be inserted into the terrain.
COLLAT(I5)	This value is a multiplier used in com-
(Columns 6-10)	puting collateral damage. It is multiplied by the population density figure for the hex attacked.
RADIAT(I5)	The application of these variables has
(Columns 11-15)	not yet been defined.
CHEMIK(I5)	
(Columns 16-20)	
EXTRA1(I5)	Tons per unit
(Columns 21-25)	
EXTRA2(I5)	Type of damaged equipment (zero if no
(Columns 26-30)	damage)
EXTRA3(I5)	Type of repaired equipment (zero if no
(Columns 31-35)	repair)

EXTRA4(I5) (Columns 36-40)	Proportion damaged during attrition or repairable per cyde (depending on which of EXTRA2 or EXTRA3 is non zero).

3. Allocation Data Cards (Target Tables) (Weapon Effects Tables)

Format Specification: 9F7.2

Input Variables:

VALUE(J)(F7.2) (Columns 1-7, 8-14, 15-21, 22-28, etc.)	Fire allocation factor for target J up to a maximum of J = 9.

Note: The weapons effects data follows the basic asset descriptor data. It includes up to three tables: attrition, supression, and allocation. The number of tables read is given by NTABS, and the number of values in each table by NTGTS, both specified on card 1. All tables use a format as follows: 9F7.2. (If there are more than 9 target types, multiple cards are read for each table as neccssary.)

a. Attrition

The attrition table gives theoretical kill rates against each of the respective target classes from 1 to NTGTS. This is the number of kills per time interval. Adjustments for target representation is made after input by the input processor.

b. Suppression

This table is similar to that of the attrition table, except the result is supression of the target asset and its unit.

c. Allocation

This table gives allocation factors for the various classes of targets if used.

G. NUCLEAR/CHEMICAL READINESS TABLES

This data defines the impact of Nuclear/Chemical readiness states on the various model processes. This information is stored in the NCRELM data structure and is accessed through the TYPLEM and TYPBLK data structures.

Section G of "INWARS Combat Interactions Data Structures" provides additional information.

The input deck includes a header card which specifies the number of readiness tables to be input. Each table is specified by an input data set consisting of three (3) card types. Figure 6 illustrates a two (2) table nuclear/chemical readiness input deck.

1. Nuclear/Chemical Header Card

   Format Specification: 10X, I5

   Input Variable:

NNCSTS(I5)	Number of sets of nuclear/chemical
(Columns 11-15)	readiness tables.

2. Applicable Unit Types Card

   Format Specification: 8I5

   Input Variables:

NTYP(1)(I5)	First unit type to which nuclear/chemical
(Columns 1-5)	readiness tables apply.
NTYP(2)(I5)	Second unit type to which nuclear/chemical
.	readiness tables apply.
NTYP(8)(I5)	Last unit type to which nuclear/chemical
(Columns 36-40)	readiness tables apply.

   Note: Up to eight (8) unit types may be specified for each set of nuclear/chemical readiness tables. However, as few as one (1) unit type is sufficient to drive the program without loader errors.

3. Nuclear/Chemical States Card

   Format Specification: 2I5

   Input Variables:

NNUCST(I5)	Number of nuclear readiness states.
(Columns 1-5)	
NCHMST(I5)	Number of chemical readiness states.
(Columns 6-10)	

4. Nuclear/Chemical Effects Card

   Format Specification: 6F7.3, 3X, O12

Section G of "INWARS Combat Interactions Data Structures" provides additional information.

The input deck includes a header card which specifies the number of readiness tables to be input. Each table is specified by an input data set consisting of three (3) card types. Figure 6 illustrates a two (2) table nuclear/chemical readiness input deck.

1. Nuclear/Chemical Header Card

   Format Specification: 10X, I5

   Input Variable:

NNCSTS(I5)	Number of sets of nuclear/chemical
(Columns 11-15)	readiness tables.

2. Applicable Unit Types Card

   Format Specification: 8I5

   Input Variables:

NTYP(1)(I5)	First unit type to which nuclear/chemical
(Columns 1-5)	readiness tables apply.
NTYP(2)(I5)	Second unit type to which nuclear/chemical
.	readiness tables apply.
NTYP(8)(I5)	Last unit type to which nuclear/chemical
(Columns 36-40)	readiness tables apply.

   Note: Up to eight (8) unit types may be specified for each set of nuclear/chemical readiness tables. However, as few as one (1) unit type is sufficient to drive the program without loader errors.

3. Nuclear/Chemical States Card

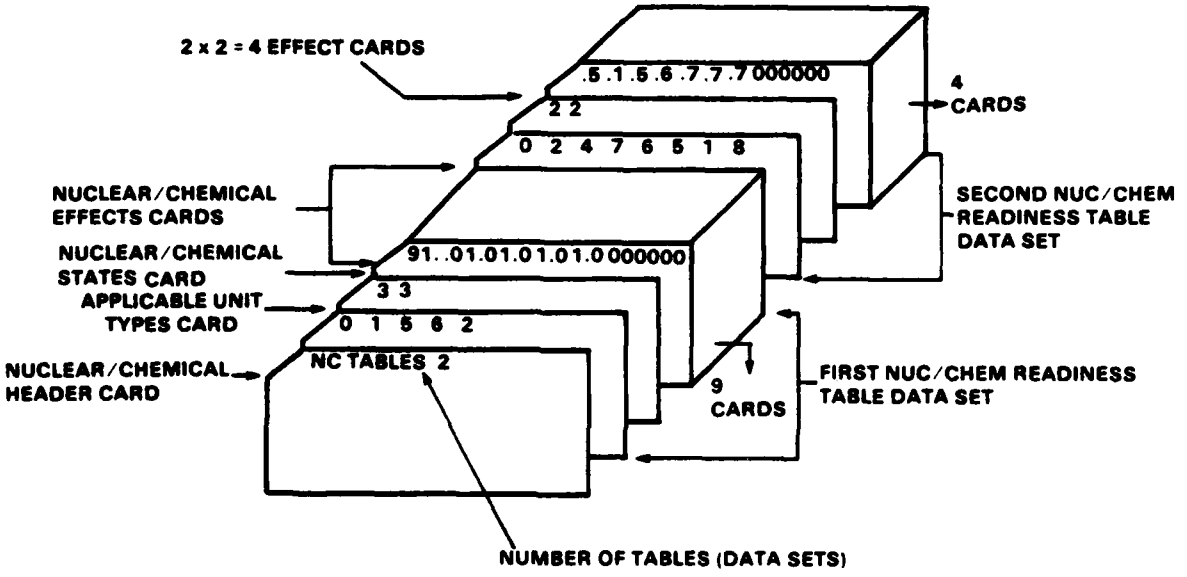
   Format Specification: 2I5

   Input Variables:

NNUCST(I5)	Number of nuclear readiness states.
(Columns 1-5)	
NCHMST(I5)	Number of chemical readiness states.
(Columns 6-10)	

4. Nuclear/Chemical Effects Card

   Format Specification: 6F7.3, 3X, 012



80W/00102

Figure 6. Table Nuclear/Chemical Readiness Input Deck

Input Variables:

DISPOS(F7.3) (Columns 1-7)	Change in disposition of the unit due to the nuclear/chemical readiness posture. 1.0 = no effect on disposition. This value is multiplied by the operation's determined disposition to find the actual disposition.
DEGRAD(F7.3) (Columns 8-14)	Degradation in effectiveness of the unit. Affects movement as well as the attrition and suppression mechanism. 1.0 = no effect.
NVULN(F7.3) (Columns 15-21)	Nuclear vulnerability factor applied to attrition and suppression inflicted on a unit by nuclear weapons. 1.0 = no effect.
CVULN(F7.3) (Columns 22-28)	Same as NVULN but for chemical weapons.
DECONT(F7.3) (Columns 29-35)	Decontamination rate factor. (Not implemented.)
COMMS(F7.3) (Columns 36-42)	Communications effect factor. (Not implemented) 1.0 = no effect.
ORFLGS(012) (Columns 46-58)	ORS - Operation Reaction System flags. Indicates to decision making process the nuclear/chemical status. (Also referred to as BGFLGS.)

Note: The number of nuc/chem effects cards will be equal to the number of nuclear readiness states times the number of chemical readiness states (NNVCST * NCHMST)

H. OPERATION REACTION SYSTEM TABLES

This series of input tables defines the operation reaction tables for specified unit types. These tables are loaded into the basic descriptor block data structure BGSELM which identifies the unit of operational

behavior. This structure is accessed through the array BGSARY which is indexed by the BGSID field found in the ORDELM data descriptor blocks. Additional information is provided in Section 8 of "INWARS Combat Interactions Data Structures.

The input deck includes a header card which specifies the number of operation reaction systems used in the simulation. Input for each ORS must include a situation code card, situation cards, an action card, action code cards, an ORS parameter card, action table cards, output table cards, and mission transition table cards. This deck structure is illustrated in Figure 7.

1. ORS Header Card

   Format Specification: 10X, I5

   Input Variable:

NBGST(I5)	Number of the Operation Reaction Systems
(Colums 11-15)	to be input. Each of these systems
Max = 8	requires all of the following cards.

2. Situation Parameter Cards

   Format Specification: I3, 1X, A6, I2, I3, I5, 2I2, 3X, O12, I3, I2, O12/2(3X, O12)

   Input Variables:

NXBGS(I3)	Number of the Operation Reaction System
(Columns 1-3)	data set which follows. This value should be numbered consecutively beginning with the first ORS data set entered as 1.
NAME(A6)	Name of the Operation Reaction System
(Columns 5-10)	which follows. This name should be descriptive of the actual function of the ORS. For example, an ORS for ground combat units might be named GROUND.
NXOPS(I2)	An index which identifies the set of
(Columns 11,12)	operation descriptor blocks used in conjunction with this ORS.

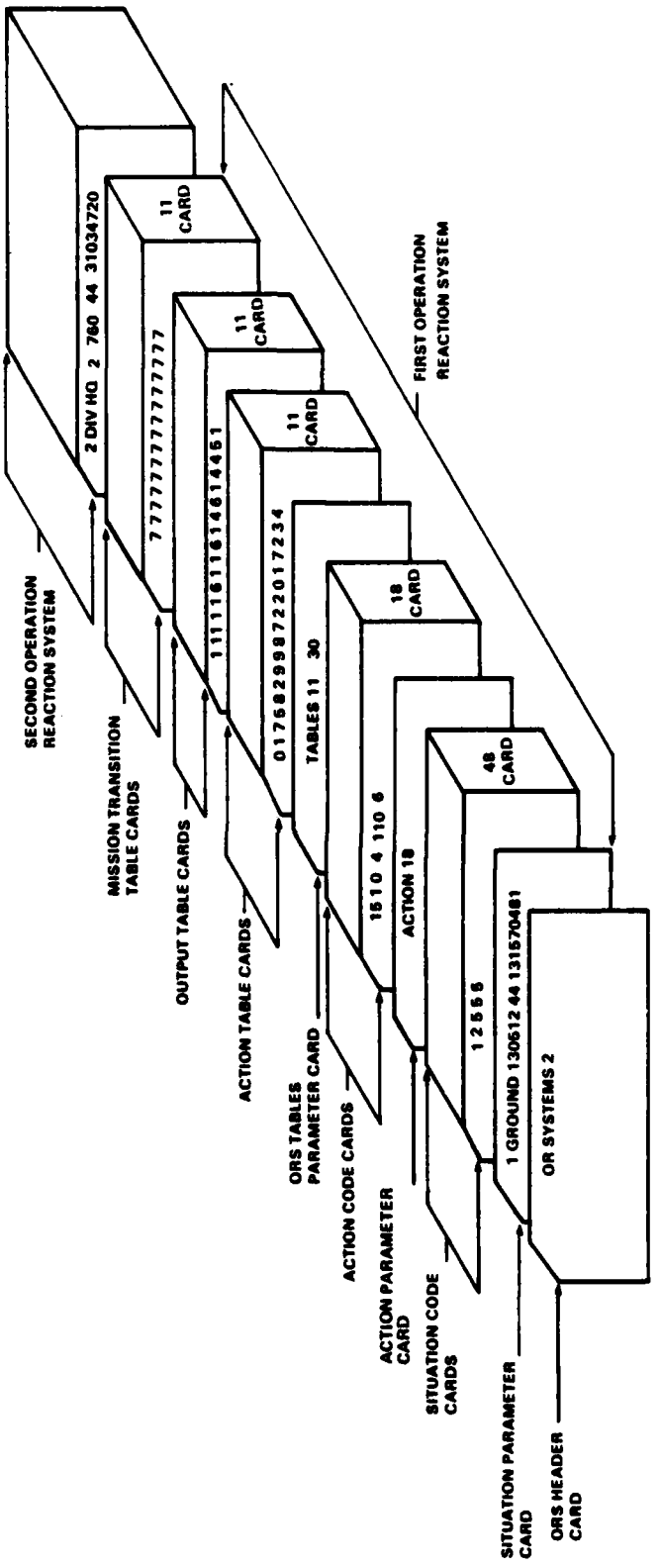


Figure 7. Operation Reaction System Deck

NSITS(I3) (Columns 13-15)	The number of situations which are used in the ORS.
NENTRI(I5) (Columns 16-20)	Determines size of situation table. Total number of entries = 2^n where n is the number of situation components. Used in conjunction with NTRYPW. (512 or 64)
NTRYPW(I2) (Columns 21,22)	Specifies the number of the situation table entries per word in the situation table. Max = 20.
NWDPLN(I2) (Columns 23,24)	Number of words per line during entry of the situation code tables. Normally the same as NTRYPW.
SITPAT(O12) (Columns 29-40)	Word containing flags which indicate the situation components used by the ORS. The number of bits set to one must correspond to the value in NENTRI.
NCARDS(I3) (Columns 41-43)	Number of cards in following situation tables (EQ # situation cards).
FLGTOP(I2) (Columns 44,45)	Flag indicates if the order element corresponding to this ORS should be at the top of the list. (Necessary for the combat specification.)
SITCLR(O12) (Columns 49-60)	Indicates situation flags which are cleared each cycle. Other flags are cleared less often. A bit is set for each flag which is not cleared.
SMSGUP(O12) 2nd card, (Columns 4-15)	Situation message up. This field specified those flags which are used to send information to the unit's commander. If any flag is set both in this field and in the unit's current situation word, the flag will also be set in the unit's commander's situation word.

SMSGDN(012) 2nd card, (Columns 19-30)	Situation message down. This field, similar in function to SMSGUP, is used to relay situation information to subordinate units. Flags are set in all subordinates if there is a corresponding flag set both in this field and in the unit's situation word.

The flags which are identified in the fields SITPAT, FLGCLR, SMSGUP, and SMSGDN are as follows:

Bit	Identity	Indicates
0 (lsb)	FLGFR1	Dangerous force ratio
1	FLGFR	Normal force ratio
2	FLGPEN	Enemy penetration
3	FLGFLR	Right flank threat
4	FLGFLL	Left flank threat
5	FLGADJ	Enemy unit within search pattern
6	FLGHEX	Enemy unit in same hex
7	FLGFLK	Flank threat
8	FLGMTG	Meeting engagement condition
9	FLGOBJ	At objective
10	FLGSU1	Supply replenishment required
11	FLGSUP	Supplies degrading capabilities
12	NXEFF1	←□□εψτι×ενεσσ ινφεχ
13	NXEFF2	
14	FLGCV	Chemical victim
15	FLGNV	Nuclear victim
16	FLGCRS	Chemical readiness state
17	FLGNRS	Nuclear readiness state
18	FLGAV	Air attack victim
19	FLGTIM	Time for op order expended
20	FLGOPS	Planning: not preferred operation
21	FLGLRS	Planning: last resort operation

23-35	Definition of these flags depends on the construction of roles and operations and will vary with echelon and operation.

3. C^2I Operation Equivalence Card

The Command Control and Intelligence processes send down orders which have broad mission codes which do not generally correspond directly to these in the unit receiving the order. This card gives a mapping from the C^2I mission codes into those of the particular ORS.

Format Specification: I5, 20I3

Input Variables:

NMCODS(I5) (Columns 1-5)	Number of Codes: This gives the number of C^2I mission codes, and hence the number of additional entries on this card.
VALUE;(I3) (Columns 6-8, 9-11, 12-14, etc)	For each of the C^2I mission codes, the input VALUE; gives the translation of that mission for this particular ORS.

3. Situation Code Cards

Format Specification: 2X, 03, 20I3

Input Variables:

WRDNDX(03) (Columns 3-5)	Word index. Indicates word position from top of situation table. Allows words with "don't care" entries to be omitted.
VALUE(J)(I3) J = 1 to 20 (Columns 6-8, 9-11, 12-14, etc)	Situation codes used to convert the field of situation bits into a single code which identifies a class of situations which cause a similar response. Maximum value of J is given by NTR YPW on a previous card

5. Action Parameter Card

Format Specification: 10X, I5

Input Variables:

NACTNI(I5) (Columns 11-15) — Number of action code cards which follow.

6. Action Code Cards

Format Specification: 2I3, 1X, 02, 1X, 02, 2X, 01, 2X, 03, 2X, 03, 1X, 01, 3I3, 2X, 012, 3X, 012, 3X, 012

Input Variables:

SITCOD(I3) (Columns 1-3) — Situation code which is put into the contingency pointer to the old order if a push occurs.

CONID(I3) (Columns 4-6) — Contingency code which is put in the contingency pointer of the new order during a "push."

NEWOBJ(02) (Columns 8,9) — Hex number which specifies (if nonzero) a new objective for the unit. The current objective is replaced by the hex vector given by NEWOBJ added to the unit's current hex location given in the unit scoreboard as HEXLOC.

LEVFLG(02) (Columns 11,12) — This field, if nonzero, will cause redefinition of the hex levels at which the unit is represented in the hex tree. It is composed of six bits each representing a hex level.

Bit	Level	Diameter (km)
0 lsb	0	9.5
1	1	25
2	2	66
3	3	175
4	4	463
5	5	1225

HEXLEV(01) — Hex level. This field indicates a change

(Column 15) to a different hex level if other than 7, with the value giving the level as listed above.

FLAGS(03) (Columns 18-20) This field is composed of a series of flags as follows:

Bit	Identity	Purpose
0	FLGMOV	Causes move reconsideration.
1	FLGROB	Causes the operation order objective to be saved in relative form when a stack push is executed.
2	FLGPSH	Causes a stack push.
3	FLGPLN	Causes a headquarters unit to plan.
4	FLGXUN	Causes unit elimination. Unit is purged from model.
5	FLGOBJ	Indicates which type of objective is to be used. 0 = hex objective 1 = unit relative objective (See Section G7)

REQSTS(03) (Columns 23-25) This field is used to indicate requests. Each digit gives the request priority level for GS artillery, air support, and logistics respectively. The request levels are:

Ø - no request
1 - target of opportunity
2 - normal support
3 - high priority requirement

ASTCOD(01) (Column 27) Assist code. Not yet implemented.

REASGN(I3) (Columns 28-30)	Reassignment to a different role - not implemented.
TEMPLU(I3) (Columns 31-33)	If nonzero, this initiates creation of a new unit, subordinate to the unit for which the ORS is operating. This field gives the template number of the new unit. If this is the case, the objective fields and flags are used to specify the new unit's op order, rather than their normal purpose.
UNITNX(I3) (Columns 34-36)	If FLGOBJ is set to 1, a unit oriented objective is specified. This field gives the relationship of the unit. Ø = parent unit 4 = sibling, air base cluster 5 = sibling, service support others TBD
SITUAT(012) (Columns 39-50)	This is a field of situation flags which is OR'ed into the unit's situation word. See Section 2F2 for flag identity.
SMSGUP(012) (Columns 54-65)	Situation message up. This field has a function similar to SITUAT, but the flags are set in the parent unit.
SMSGDN (012) (Columns 69-80)	Situation message down. This field has a function similar to SITUAT, but the flags are set in all subordinate units.

7. ORS Tables Parameter Card

Format Specification: 10X, 2I5

Input Variables:

NMISNI(I5) (Columns 11-15)	Number of cards in each of the following three input tables (e.g., the action table cards, output table cards, and mission transition table cards) may be thought of as the number of rows in each table.

NENTRI(I5) (Columns 16-20)	Number of codes on each card of the following three input tables. May be thought of as the number of columns in each table. If NENTRI is greater than 20, the values are on 2 or more cards with vormat 20I3 as necessary to input the specified number of values, for each of the 'cards' in Sections 8, 9, and 10 below.

8. Action Table Cards

Format Specification: 20I3

Input Variables:

VALUE(J)(I3) (Columns 1-3, 4-6, etc.)	Codes input to ACTCOD action code field of the BGSWRD data structure. A zero indicates no actions. Note that for J greater than 20, an additional card(s) are used for each mission code, up to the limit given by NENTRI previously.

9. Output Table Cards

Format Specification: 20I3

Input Variables:

VALUE(J)(I3) (Columns 1-3, 4-6, etc.)	Codes input to OPCODE operation code field of the BGSWRD data structure. A zero indicates that the operation code is unchanged. Note the use of multiple cards for J 20 as in 8. above.

10. Mission Transition Table Cards

Format Specification: 20I3

Input Variables:

VALUE(J)(I3) (Columns 1-3, 4-6, etc.)	Codes input to MISCOD new mission code field of the BGSWRD data structure. If zero, the mission code is unchanged. Note the use of multiple cards for J>20 as in 8. above.

I. OPERATIONS DATA

This data defines the mode of operation for all combat units. Operations data is stored in a group of related data structures referred to collectively as the operation structure. These structures include: CONELM, OPDSBK, CONBLK, POPBKE, SHWORD, OPCFEL, TYPELM, BGSELM, ROLE, PHASE, OPORD, and OPORDP. The operation structure is a set of operation order templates organized into roles and phases which constitute the way in which the operation is to be carried out by lower echelon units. Sections 7, 9, and 10 of "INWARS Combat Interactions Data Structures" provides additional information.

A typical input deck is illustrated in Figure 8. The user is cautioned to read the remainder of this section carefully as the structure of this deck may vary considerably based on specified input parameters.

1. Operations Header Card

   Format Specification: 10X, I5

   Input Variable:

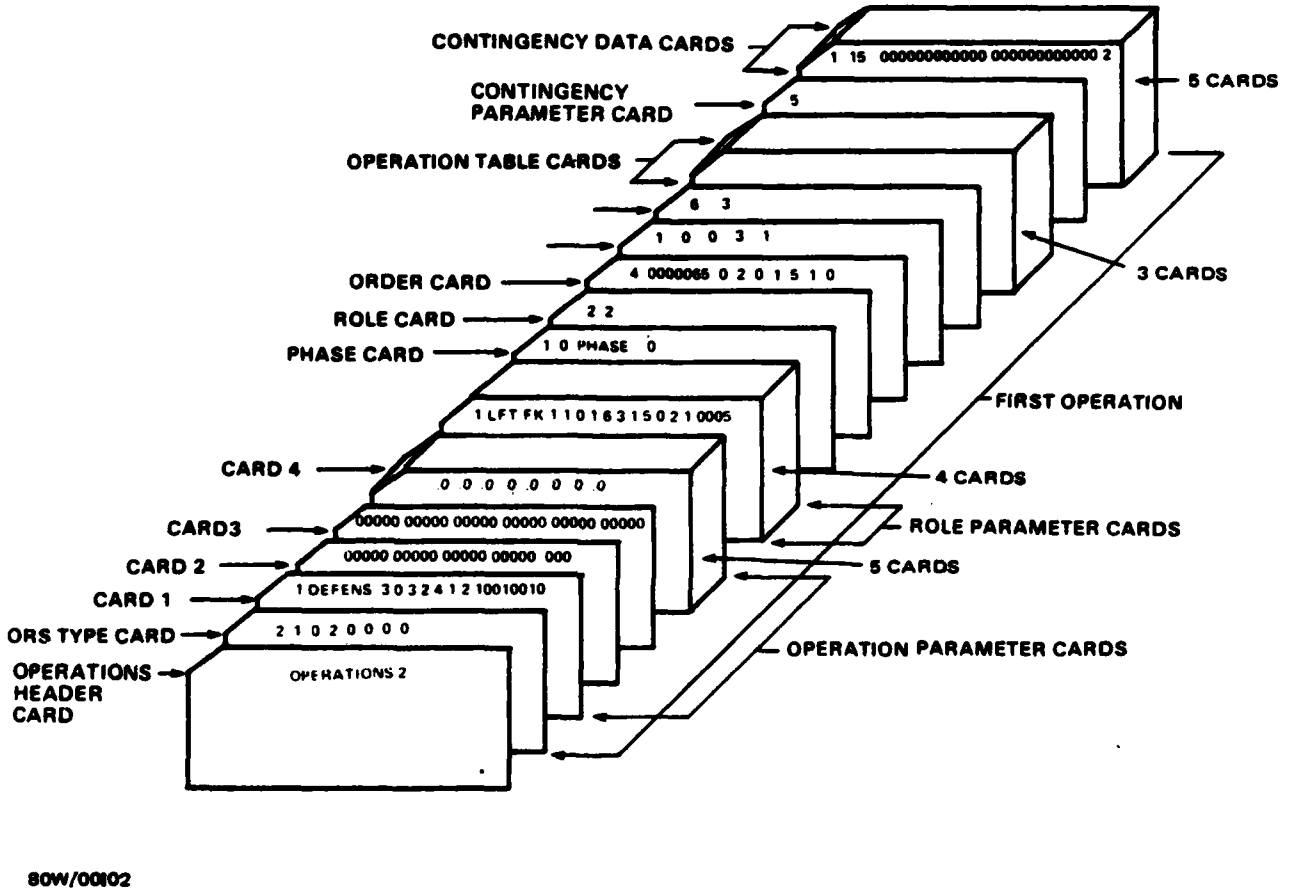
NOSETS(I5) (Columns 11-15)	Number of sets of operations to be undertaken.

2. ORS Type Card (INOPD)

   Format Specification: 16I5

   Input Variables:

II(I5) (Columns 1-5)	ORS type for which the operation is intended.
NOPSII(I5) (Columns 6-10)	Number of Operations in the set.
TABLS(I5) (Colums 11-15)	Number of table entry types in each operation.
NTYP(I)(I5) (Columns 16-20, 21-25, 26-30, etc.) (Max = 8)	Unit type pointer index. ORS types which will use this class of operations.



80W/00102

Figure 8. Operations Data Deck

3. Operation Parameters Cards (INOPD)

Eight cards for each operation.

a. Card Type 1

Format Specification: I3, 1X, A6, F10.2, 5I3, 4I5

Input Variables:

OPNO(I3) (Columns 1-3)	Operation number-indexes pointer.
OPNAME(A6) (Columns 5-10)	Six character name for the operation.
FSPEED(F10.2) (Columns 11-20)	Basic speed for "normal" conditions for this operation prior to modifications.
SRCHNO(I3) (Columns 21-23)	Identifies type of perception/search/ disposition pattern used if no search defined on a basis of unit type.
ALTENO(I3) (Columns 24-26)	Operation code of an alternate operation to be implemented if the assigned operation is not suitable. (For units which plan only.)
NROLES(I3) (Columns 27-29)	Number of roles in the operation structure. (Zero if unit doesn't plan under this ORS.)
NPHASE(I3) (Columns 30-32)	Number of phases in the operation structure. (Zero if unit doesn't plan under this ORS.)
UNREQ(I3) (Columns 33-35)	Number of units required to implement the operation. (Planned operations only.)
STRREQ(I5) (Columns 36-40)	Strength requested. (Not used.)
FRCERQ(I5) (Columns 41-45)	Force requirements in units of strength. (Used in planning only.)
EFFREQ(I5) (Columns 46-50)	Effectiveness requirement for the force as a whole. Force effectiveness is a weighted average for all elements of the force.

TIMERQ(I5) (Columns 51-55) — Time required for execution of the operation under 'normal' circumstances. (Planned operations only.)

Note: A zero should be inserted if a field is not used.

b. Card Type 2

Format Specification: 4I5, 2X, 03

Input Variables:

OBJTYP(I5) (Columns 1-5) — Identifies criteria for setting the "AT OBJECTIVE" flag FLGOBJ.

OBJTYP	Description
0	Must occupy objective hex
1	Criteria satisfied if within number of hexes specified in OBJDST
2	Unit need only be beyond objective with respect to axis and within distance given by OBJDST. (Not yet implemented.)

OBJDST(I5) (Columns 6-10) — Distance to objective to satisfy objective criteria.

SECTOR(I5) (Columns 11-15) — Sector width in hexes

MASS(I5) (Columns 16-20) — Massing valve. # units/hex max.

ENGMOD(03) (Columns 23-25) — Engagement mode. This set of flags specifies the engagement modes for which this operation may be used. See section 2C2, field UNENGR, for engagement mode flag identification.

c. Card Type 3

Format Specification: 10I5

Input Variables:

SUPTYP(I5) (Columns 1-5)	Asset type which is expended at a constant rate per interval.
SUPRAT(I5) (Columns 6-10)	Quantity of the asset SUPTYP expended per unit time.
SUPLEV(I5) (Columns 11-15)	Quantity of asset SUPTYP needed for unimpaired operation. At lower levels the speed of the unit is multiplied by proportion remaining times the factor MOVSUP.
SUPLV1(I5) (Columns 16-20)	Quantity of asset SUPTYP which is a threshold for setting the supply flag.
POLTYP(I5) (Columns 21-25)	Identifies an asset type which is expended in conjunction with unit movement.
POLRAT(I5) (Columns 26-30)	Amount of the asset POLTYP expended per hex moved.
POLLEV(I5) (Columns 31-35)	Quantity of the asset POLTYP necessary for unimpaired operations. At lower levels the speed of the unit is multiplied by the proportion remaining times the factor MOUPOL.
POLLV1(I5) (Columns 36-40)	Threshold for FLGPOL.
OTHER1(I5) (Columns 41-45)	Extra (not used).
OTHER2(I5) (Columns 46-50)	Extra (not used).

d. Card Type 4 (5 Cards)

Format Specification: 8F7.3

Input Variables:

VALUE(J) (Columns 1-7,	This parameters affect various processes in the model. They are listed below in

8-14, etc.) order of entry. The maximum allowed value is 7.99.

1) Combat Computation Effects

The following parameters are applied during the computation of attrition and suppression effects: They are listed in the order of input of the corresponding value (J) as described above.

(1) ATRFT - Terrain utilization, the extent to which the unit utilizes terrain for protection.

(2) ATRFR - The extend to which rivers, if present, affect combat results suffered.

(3) ATRFBH - The extent to which occupying a barrier hex affects combat results suffered.

(4) ARTFBS - The extent to which a barrier hex side between firing and target units affects combat results suffered.

(5) ATRFN - The effect of terrain on nuclear weapon combat effects.

(6) ATRFC - The effect of terrain on chemical weapon combat effects.

(7) ATRFNV - Nuclear vulnerability, factor.

(8) ATRFCV - Chemical vulnerability factor.

2) Movement Direction Weighting Effects

The following factors are coefficients in the scoring equation used to choose the next hex during movement.

(1) MDWSPD - Weighting factor for speed expected to candidate direction.

(2) MDWTHR - Weighting factor for enemy threat, where threat is the negative enemy to friendly force ratio.

(3) MDWOBJ - Weighting factor for direction to objective, where the direction component is 90 minus the angle between the candidate direction and a straight line to the objective.

(4) MDWMAS - Weighting factor for massing of friendly forces, where the massing effect is the negative of the difference between friendly strength in the hex and desired massing, MASS, divided by 100.

(5) MDWCOH - Weighting factor for cohesiveness; influenced by the proximity of friendly sibling units on flanks.

(6) MDWFDR - Weighting factor for flank danger. Not implemented.

(7) MDWNCT - Weighting factor for nuclear and chemical contamination effects of terrain.

3) Movement Speed Effects

(1) MOVFT - Extent of terrain effects on movement speed.

(2) MOVFR - Extent of the effect of a river hex side on movement speed.

(3) MOVFBH - Extent of the effect of a barrier hex on movement speed.

(4) MOVFBS - Extent of the effect of a barrier hex side on movement speed.

(5) MOVFNC - Factor modifying speed for nuclear contamination/effects in the hex.

(6) MOVFCC - Factor modifying speed for chemical contamination/ effects in the hex.

(7) MOVNCR - The extent of the impact of the degradation factor resulting from the nuclear/chemical readiness posture on unit speed.

(8) MOVEFF - The impact of decreased effectiveness index on unit speed. This factor is multiplied by speed for NXEFF=1, es squared and multipled by speed for NXEFF=2.

(9) MOVPOL - The effect of inadequate petroleum/oil/lubricant type supplies on movement speed.

(10) MOVSUP - The effect of inadequate non POL type supplies on movement speed.

(11) MOVFFR - Movement speed factor for "normal" force ratio condition as indicated by FLGFR in the unit scoreboard situation word.

(12) MOVFR1 - Movement speed factor for "dangerous" force ratio condition.

4) Various Other Data

(1) DISPOS - Disposition of unit, gives the average proportion engaged at each echelon of the organization for this operation. Max = 100, minimum about 20.

(2) EEVALF - Enemy evaluation factor: During the summation of Threat and flank threat indicies, friendly forces are weighted -1. This factor determines the weighting for enemy units.

(3) SRECOV - Suppression recovery rate for unit.

(4) ERECOV - Effectiveness recovery rate for reconstitution, applied only when unit is not in contact with enemy units.

5) Perception Effects

(1) EFF1 - Breakpoint for marginal effectiveness, in fraction of base strength.

(2) EFF2 - Breakpoint for negligible effectiveness, in fraction of base strength.

(3) EFF3 - Breakpoint for unit dissolution EFF4 breakpoint (undesignated)

(4) EFF4 - Breakpoint (undesignated).

(5) FLDANG - Value of the respective flank threat indices which will result in the flags FLGFLL or FLGFLR being set.

(6) FRNORM - Force ratio (enemy/friendly) which, if exceeded, results in the flag FLGFR in the unit situation word being turned on to indicate a "normal" force ratio.

(7) FRDANG - Force ratio (enemy/friendly) which, if exceeded, results in the flag FLGFR1 in the unit situation word being turned on to indicate a "danger" situation.

(8) OTHER3 - Unused at this time.

4. Role Parameter Cards (1 per Role) (INPOST)

Format Specification: I3, 1X, A6, 4I3, 2X, 02, I3, I7, 2I3, 2X, 07, I5, 3X, 02, 4X, 01, I5

Input Variables:

ROLEID(I3) (Columns 1-3)	Role identification number. Also points to an element ROLEM in the array ROLARY which governs the aggregation and processing of situation information.
NAME(A6) (Columns 5-10)	Name of the role.

ELEMENTS(I3) (Columns 11-13) — Number of force elements (units) which may be allocated to this role.

TYPE(I3) (Columns 14-16) — Type of unit required for this role.

CLASRQ(I3) (Columns 17-19) — Classification identity requested. This is the classification of unit preferred in the role. Ground unit types as follows:

1. Armor/tank
2. Mechanized
3. Infantry
4. Mech. Cavalry
5. Artillery
6. Air Defense
7. Support

CRITEL(I3) (Columns 20-22) — Number of force elements (units which are critical to the performance of this role.

FLGS(02) (Columns 24-25) — Field of one bit flags.

Bit	Name	Description
0	OBJTYP	Objective type.
1	FLGDEF	Default role for units not able to assume other roles.
2	FLGTMP	
3	FLGLST	Order should be put at end of order element list.
4	FLGCRT	Indicates role critical to operation (must be filled).
5	FLGCLA	Classification flag. Indicates, if on, that the correct classification of unit in the role is essential.

BGSID(I3) (Columns 26-28) — Applicable ORS identification for the subordinate unit.

STRNGT(I7) (Columns 29-35) — Minimum required force for the role, in units of asset effectiveness.

SECTW(I3) (Columns 36-38) — Sector width in hexes.

OBJTYP(I3) (Columns 40-46) — Objective type (0-1).

HEXOBJ(07) — Immediate hex objective from which a unit in this role would depart. This orients the role position with respect to the parent unit position. Relative to parent unit center of mass.

EFFREQ(I5) (Columns 47-51) — Effectiveness state required of a unit to be assigned to this role.

FLAGS(02) (Columns 55, 56) — Field of flags relating to the unit's order element ORDEM when the operation is implemented.

Bit	Name	Description
0-2		Undefined
3	FLGCBT	Identifies an order element to be used for combat calculations.
4	FLGPER	Perception function only.
5	FLGLST	identifies last element.

DISROL(01) (Column 61) — Disposition role. This identifies the type of role according to its disposition:

1: Left flank
2: Right flank front
0: Center
3: Rear/reserve/Hq, etc.

NEVAL(I5) (Columns 62-66) — Number of evaluation elements to follow. If zero, no evaluation elements are inputted.

5. Evaluation Element Cards (INPOST) (1 Set Per ROLE)

The evaluation element specifies the information aggregation process by which situation features can be combined to detect the presence of other situation features. The different evaluation elements are applied to different echelons. The first element causes information aggregation into the unit's own situation word, the second into his commanding unit's situation word. In INWARS only two evaluation elements will be used at the brigade level. See "INWARS CIS Data Structures" section B14 for details and "INWARS CIS Software Modules" section C6.

a. Card 1

Format Specification: 3I5

Input Variables:

NANDFL (Columns 1-5)	Number of flags modified in unit using a logical "and" criteria.
NORFL (Columns 6-10)	Number of flags modified in unit using a logical "or" criteria.
NADDFL (Columns 11-15)	Number of flags modified in unit using a summation criteria.

b. Following Cards

Format Specification: 3X, 012

The following cards define the evaluation process. They are divided into three sections for the AND, OR and SUMMATION oriented processes. The total number of cards is equal to:

NANDFL + NORFL + 2 * NADDFL + (number of nonzero fields in Card 1)

Cards:

AND Flag Specification: Flags corresponding to flags to be modified in unit. This card is put in for any NANDFL $\neq \emptyset$. The number of bits set in this field must equal NANDFL.

AND Flag criteria Cards (number - NANDFL): For each bit set in the AND specification, from right to left, there is a card which specifies which flags must be set in the unit situation word.

OR Flag Specification Card: Similar to AND specification, one card if NORFL $\neq 0$.

OR Flag Criteria Cards (number = NORFL).

ADD Flag Specification: Similar to AND specification, one card if NADDFL ≠ 0.

ADD Flag Sum Component Cards (number = 2 ° NADDFL): For each ADD flag, from right to left, there are two cards. A bit set in the first indicates a 1, and in the second indicates a 2, which are summed if the respective flag is on.

6. Phase Card (1 for Each Phase)

Format Specification: I3, 1X, A6, I3

Input Variables:

PHASID(I3) (Columns 1-3)	Phase identification number.
NAME(A6) (Columns 5-10)	Name of phase.
TIME(I3) (Columns 11-13)	Amount of time, in combat cycles, that normally would be needed for a given phase of the operation.

7. Role Card (1 per Role)

Format Specification: 2I5

Input Variables:

PRIRTY(I5) (Columns 1-5)	The priority of the role during the phase. Gives a relative importance to the overall accomplishment of the mission.
RESOUR(I5) (Columns 6-10)	The relative priority of the role with respect to the allocation of resources.

8. Order Card (INPORD)

Format Specification: I5, 3X, 07, 8I5

Input Variables:

MISCOD(I5) (Columns 1-5)	Mission code for the type of mission to be carried out by the unit.
HEXOBJ(07) (Columns 8-15)	Hex address of the objective defined for the unit in this operation order. Relative to the hex given in the role definition.

AXIS(I5) (Columns 16-20)	Axis of operation. Azimuth angle expressed as an integer number of degrees clockwise from north, which orients the unit's operation.
SECTOR(I5) (Columns 21-25)	Sector width of the unit in hexes.
TIME(I5) (Columns 26-30)	Timer which can be used to specify an interval over which the operation is effective.
NCONTS(I5) (Columns 31-35)	Number of contingency pointers.
ROLEID(I5) (Columns 36-40)	Identification number which specifies the role filled by the unit in a multi-unit coordinated operation being conducted at the next higher echelon. It affects the manner of info aggregation.
FLGTMP(I5) (Columns 41-45)	Flag which specifies that the operation order pointed to is in template form. (see FLGCTM below)
NTEMP(I5) (Columns 46-50)	Number of template order if it is to be referenced.
FLGOBJ(I5) (Columns 51-55)	(Always zero)

9. Contingency Card (INPORD) (If NCONTS ≠ 0 in Previous OPORDER)

Format Specification: 5I5

Input Variables:

CONID(I5) (Columns 1-5)	Contingency identification which causes the associated contingency operation order to be implemented. Defines contingency in terms of the situation.
SITCOD(I5) (Columns 6-10)	Situation code which causes the contingency order to be implemented. The contingency order will be used if either the

contingency is recognized or the situation code matches that computed from the current situation.

CONDC(I5) (Columns 11-15) — Contingency disposal code.

CONDC	Disposition
0	Do not dispose of contingency order.
1	Dispose of contingency order.
2	Attach contingency to the new current order when a "push" is executed.
3	Attach contingency to the new current order when a "pop" or contingency is executed.

FLGCTM(I5) (Columns 16-20) — This flag, if nonzero, specifies that the operation order pointed to is in template form. This means it has not been oriented or detailed for the unit. The use of template orders allows one copy to exist which may be referred to by the order structures of many units, thus saving space. When a template order contingency is implemented, a copy of the template order is made, and the hex objective, axis, and node ID are changed to those appropriate to the unit's actual orientation and location. FLGCTM is also used to indicate linkage to the following phase if a 2 is put in. A 3 indicates that the contingency is the template given by NTEMP.

NTEMP(I5) (Columns 21-25) — Number of template order.

For each contingency with a value FLGCTM equal to zero or one, an operation order card (see section 9 above) follows. Thus the operation orders form the nodes of a tree structure, and the contingencies form the branches (although the branches may not have nodes put in at the same time; if a value of FLGCTM = 2 or 3, the node (OPORDER) is a template put in a later phase or as an earlier template.

10. Equivalent Operations Card (INOPO)

Format Specification: 16I5

Input Variables:

FVALUE(J)(I5) K = NOSETS (Number of sets of operations (Columns 1-5, 6-10, 11-15 16-20, etc.)	Equivalent operations for a unit in this operation if engaged by or engaging an enemy unit under a different operation class (e.g., air units attacking ground units).

11. Operations Tables Cards (1 for Each Table Entry Type

Format Specification: 16F5.2

Note that if there are more than 16 operations in the set, then there are more than one card read for each table. Thus, for three tables and 20 operations, 6 cards would be read using 16F5.2, 4F5.2, 16F5.2, 4F5.2, 16F5.2, and 4F5.2 respectively.

Input Variables:

VALUE(J)(F5.2) (Columns 1-5, 6-10, 11-15, 16-20 etc.)	Operations table entries. First table is for attrition, second for suppression, third for allocation.

J. CONTINGENCY DATA

The contingency data cards are used to specify the conditions under which a contingency code is recognized. It is stored in the contingency array and accessed when required to check whether a contingency order should be executed. See "INWARS CIS Data Structures" section B13 and "INWARS CIS Software Modules" section C1f for details on this data.

1. Contingency Parameter Card

   Format Specification: 10X, I5

   Input Variable:

NCONTS(I5) (Columns 11-15)	Number of contingencies.

2. Contingency Data Cards (1 for Each Contingency)

   Format Specification: 2I5, 3X, O12, 3X, O12, 3X, O12, I5

   Input Variables:

PCONT(I5) (Columns 1-5)	Pointer to contingency descriptor.
CONSIT(I5) (Columns 6-10)	Situation code which will result in recognition of the contingency.
CAFLGS(O12) (Columns 14-25)	Set of flags corresponding to those in the unit situation work which must be on for the contingency to be recognized.
COFLGS(O12) (Columns 29-40)	The on flags in this word must be off in the unit situation word to allow contingency recognition.
PCONEL(I5) (Columns 41-45)	Pointer to another contingency which also will result in the recognition of the given contingency.

K. HEX DATA

Hex data describes the characteristics of the geographic area in which combat occurs. Information on terrain and trafficability is stored in a tree data structure based on hex blocks (HEXBLK). Various levels in the tree structure correspond to particular size hexes. For the purposes of data input it is important to note that this tree structure eliminates the need for specification of a great deal of lower level hex data. A hex data card need be present only if it or one of its daughters has terrain characteristics which are different from its parent. For a more detailed explanation of the hex data structure see Section 4 of "INWARS Combat Interactions Data Structures."

The hex input deck structure is illustrated in Figure 9.

1. Hex Data Cards (1 for Each Specified Hex)

Format Specification: 1X, I1, 1X, 07, I5, 2X, 3I1, 2X, 3I1, 3I5, I2, I3

Input Variables:

EFLAG(I1) (Column 2)	Input flag which indicates hex input status. 0 = more hex cards follow 1 = last hex card
HEXLOC(07) (Columns 4-10)	Hex location. A seven digit code which specifies the unique location and level of the hex.
TERTYP(I5) (Columns 11-15)	Identifies the basic type of terrain in the hex.

Value	Type
0	Not used
1	Clear
2	Marginal for vehicles
3	Difficult
4	Urban
5	Impassable (Sea)
6, 7	Undefined

RIV1(I1) (Column 18) RIV2(I1) (Column 19) RIV3(I1) (Column 20)	Flags indicating whether rivers exist on hex sides which are in the 3, 2 or 1 directions, respectively.
BAR1(I1) (Column 23) BAR2(I1) (Column 24) BAR3(I1) (Column 25)	Flags indicating whether barriers exist on hex sides which are in the 3, 2, or 1 directions, respectively.

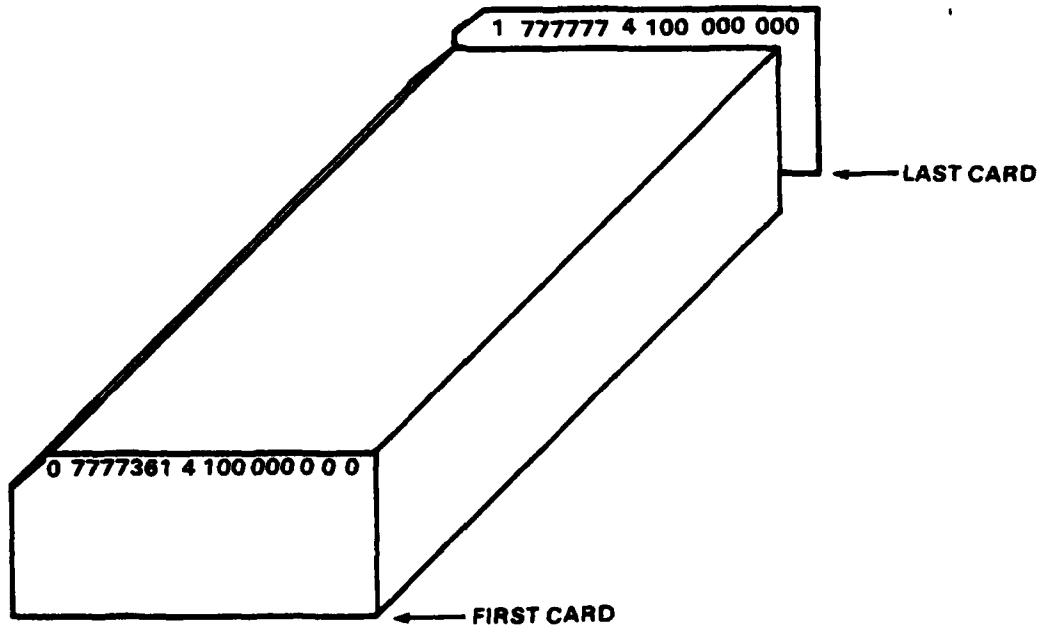


Figure 9. Hex Input Deck

BHEX(I5) (Columns 26-30)	Indicates whether the hex as a whole constitutes a barrier.
BTYP(I5) (Columns 31-35)	Barrier type. Distinguishes between two types of barriers.
POPULA(I5) (Columns 36-40)	Defines population density. The following values are currently in use: 1 — less than 250/km^2 3 — 250 to 1000/km^2 5 — over 1000/km^2
SIDE(I2) (Columns 41,42)	Gives nationality side (0 = neutral, 1 = NATO, 2 = PACT, 3 = none)
NATION(I3) (Columns 43-45)	Nationality for given side:

SIDE			NATION
0	1	2	
AU	US	SU	0
SZ	WG	EG	1
-	BR	PO	2
-	FR	CZ	3
-	BE	HU	4
-	NE	-	5
-	IT	-	6
-	DN	-	7

L. ENTITY ASSIGNMENT DATA

This data defines combat entities, including physical data such as location and asset types possessed by the unit. It also includes operation data and initial assignment of ORS types and appropriate operation codes. More detailed information is contained in Sections 1, 2, 3, 5, 8, 9, and 10 of "INWARS Combat Interactions Data Structures."

A typical input deck structure is illustrated in Figure 10.

1. Flag Card (ENTYIN)

   Format Specification: 10X, I5

   Input Variables:

FLG(I5)	Indication of new or additional units.
(Columns 11-15)	0 = Reinitialize unit numbers
	1 = Do not reinitialize

2. Unit Scoreboard Data Card

   Format Specification: 2X, (4I1, I2), 2X, (4I1, I2), 4I2, 1X, 07, 1X, 01, 1X, 6I1, 3I2, 2X, (4I1, I2), I3, I5

   Input Variables:

UNITID(4I1, I2)	A multi-field unit identifier consisting
(Columns 3-8)	of the following fields:
	(1) SIDE(I1) 1 for NATO, 2 for WPACT.
	(2) ARMYGP(I1) Front or army group identification, from 1 to 9.
	(3) CORPS(I1) Army or corps identification, from 1 to 9.
	(4) DIVISN(I1) Division identification from 1 to 9.
	(5) BRIGAD(I2) Brigade or regiment identification, from 1 to 14.
	Note: Side must be zero for template unit.
CMRID(4I1, I2)	Commander's identification. Used to con-
(Columns 11-16)	struct C^2 tree. Unit identified must have been previously input. Zero if no commander unit (such as for a template).
TYPE(I2)	Unit type identification. While the type
(Columns 17,18)	categories can be assigned by the user during initial data input, the following type identifications are now being used.

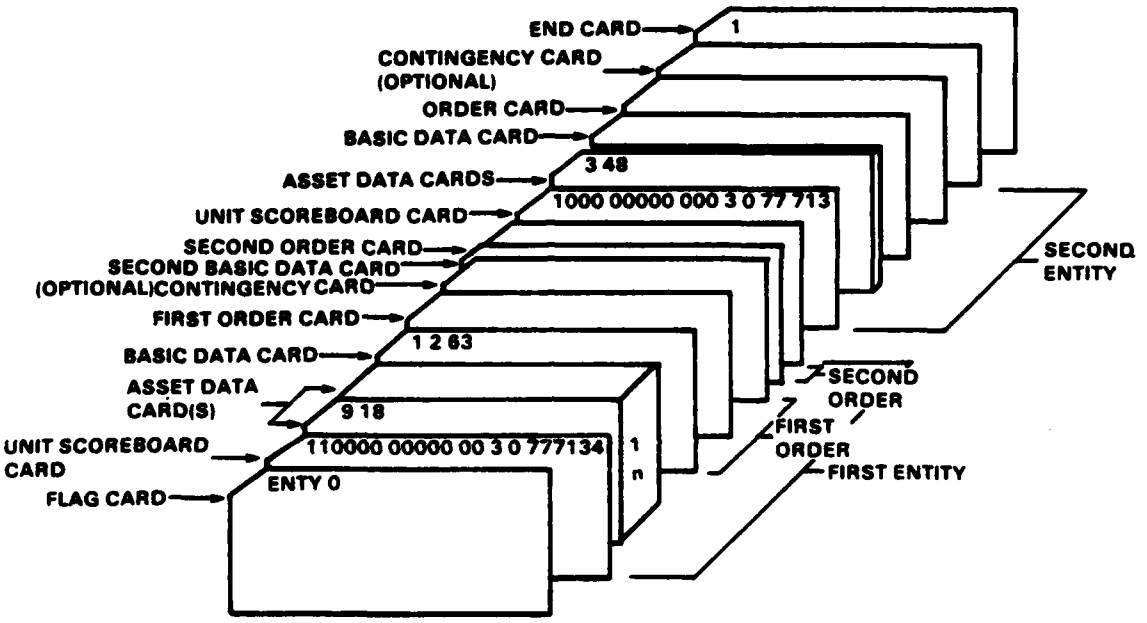


Figure 10. Entity Input Deck

Value	Type
1	Echelon above division
2	Division headquarters
3	Ground maneuver or air defense unit
4	Logistics
5	N/C supply point
6	Air base cluster
7	Air mission package
8	Weapon delivery package
15	Nuc/chem effects entity

CLASIF(I2)
(Columns 19,20)

Further identifies type of unit. It is used by the model to identify appropriate units for roles during mission planning and to define units symbols for graphics output. While these types can be redefined by the user, the following are now in use.

Value	Type
1	Armor/tank
2	Mechanized
3	Infantry
4	Mech. cavalry
5	Artillery
6	Air Defense
7	Support

ECHLON(I2)
(Columns 21,22)

Identifies the echelon of the unit within the command structure.

Echelon	Side=NATO	Pact
6	Theater	Theater
5	Army Gp	Front
4	Corps	Army
3	Division	Division
2	Brigade	Regiment
1	Detachment	-
0	-	-

NATION(I2) (Columns 23, 24)

Identifies nationality.

Nation	Side=NATO	Pact
0	US	SU
1	WG	EG
2	BR	PO
3	FR	CZ
4	BE	HU
5	NE	--
6	IT	--
7	DN	--

HEXLOC(07) (Columns 26-32)

Defines hex location of the unit in the hexagonal array. The hexagonal coordinate system is described in the INWARS Level III Specifications; Volume I.

FACING(01) (Column 34)

Octal digit indicating an orientation of the unit, which is not necessarily the same as the movement direction. It orients the search (perception) pattern of the unit.

L1(I1) (Column 36)
L2(I1) (Column 37)
L3(I1) (Column 38)
L4(I41) (Column 39)
L5(I1) (Column 40)
L6(I1) (Column 41)

Identify hex levels in which unit is initially located.

NORDPT(I2) (Columns 42,43)

Number of ORS's of a unit and number of concurrent operation orders.

NASSET(I2) (Columns 44,45)	Number of assets in the asset list.
FASSET(I2) (Columns 46,47)	Asset flag. If zero, assets follow. If 1, copy assets of unit identified in ASSREF.
ASSREF(4I1, I2) (Columns 50-55)	Reference unit for asset list if FASSET = 1.
FLGCCI(I3) (Columns 56-58)	Indicates unit has special capabilities. One for EAD Hq units, air base cluster, logistics, and weapons delivery entities, zero for others.
FLGTMP(I5) (Columns 59-63)	If nonzero, indicates a template unit. The value is the template number of the unit.

The template numbers currently defined are:

Template Number	Unit Type
1	NATO Close Air Support Air Mission Package
2	PACT Close Air Support Air Mission Package
3	NATO Interdiction Air Mission Package
4	PACT Interdiction Air Mission Package
5	NATO Nuclear Munitions Package
6	PACT Nuclear Munitions Package
7	NATO Chemical Munitions Package
8	PACT Chemical Munitions Package

All eight of these template units must be defined in the entity input deck. It is

normal practice to put them together at either the start or end of the deck. All template units should have a uni ID starting with ooo. These templates specify the types of entities which are created for air, nuclear, and chemical packages.

3. Asset Data Cards (1 for Each Asset. A Unit has NASSET.)

Format Specification: I5, F10.2

Input Variables:

ASTYP(I5) (Columns 1-5)	Asset type. Index which refers to appropriate asset description.
FNUMBR(F10.2) (Columns 6-15)	Number of assets of a given type which a unit has.

4. Basic Cata Cards (1 for Each Order)

Format Specification: 2I5, 3X, 02

Input Variables:

ORSID(I5) (Columns 1-5)	ORS which governs unit's operations.
OPCODE(I5) (Columns 6-10)	Operation code which identifies a particular operation posture for the unit. The codes are user specified. See Section VI, User's Manual. (Initial OPCODE only.)
FLAGS(02) (Columns 14,15)	This field includes the following bit flags.

Bit	Name	Description
0-2	--	Undefined
3	FLGCBT	Identifies an order element to be used for combat computations.
4	FLGPER	Perception function only
5	FLGST	Identifies last element

5. Order Card

Format Specification: I5, 2X, 8I1, 8I5

Input Variables:

MISCOD(I5) (Columns 1-5)	Mission code for the type of mission to be carried on by the unit.
HEXOBJ(7I1) (Columns 9-15)	Hex address of the objective defined for unit in this operation order. If the order is a template, this is a relative objective and thus should have leading zeros (rather than leading sevens as normal). If FLGOBJ = 1, the objective is unit-centered and not a template. The input is equivalent to 4I1, I2, where the first 6 digits are the unit ID of the objective. The referenced unit must have been put in previously.
AXIS(I5) (Columns 16-20)	Axis of operation. Azimuth angle expressed as an integer number of degrees clockwise from north, which orients the unit's operation.
SECTOR(I5) (Columns 21-25)	Sector width of the unit in hexes.
TIME(I5) (Columns 26-30)	Timer which can be used to specify an interval over which the operation order is effective.
NCONTS(I5) (Columns 31-35)	Number of contingency pointers.
ROLEID(I5) (Columns 36-40)	Identification number which specifies the role filled by the unit in a multi-unit coordinated operation being conducted at the next higher echelon. It affects the manner of info aggregation.
FLGTMP(I5) (Columns 41-45)	Flag which specifies that the operation order pointed to is in template form. (See FLGCTM.)

NTEMP(I5) (Columns 46-50)	Template number, if FLGTMP = 1, may be nonzero.
FLGOBJ(I5) (Columns 51-55)	Objective type. Ø for hex objective, 1 for unit objective.

6. Contingency Card (If Contingency)

Format Specification: 5I5

Input Variables:

CONID(I5) (Columns 1-5)	Contingency identification which causes the associated contingency operation order to be implemented. Defines contingency interims of the situation.
SITCOD(I5) (Columns 6-10)	Situation code which causes the contingency order to be implemented. The contingency order will be used if either the contingency is recognized or the situation code matches that computed from the current situation.
CONDC(I5) (Colums 11-15)	Contingency Disposal Code.

Code	Disposition
0	Do not dispose of contingency order.
1	Dispose of contingency order normally (release to ISPACE).
2	Attach contingency to the new current order when a "push" is executed.
3	Attach contingency to the new current order when a "pop" or contingency is executed.

FLGCTM(I5) (Columns 16-20)	This flag specifies that the operation order pointed to is in template form. This means it has not been oriented or detailed for the unit. The use of template orders allows one copy to exist

which may be referred to by the order structure of many units, thus saving space. When a template order contingency is implemented, a new copy of the template order is made and the hex objective, axis, and role ID are changed to those appropriate to the unit's actual orientation and location. If FLGCTM = 13, order is template; if Ø, not template. Do not use 2.

NTEMP(I5) (Columns 21-25) — Number of template order.

Note: If FLGCTM = 0 or 1, this contingency must be followed by an OPORDER card as in section 5, above.

7. End Card

Format Specification: I2

Input Variable:

FLAG(I2) (Columns 1,2) — Option to indicate end of the CIS data stream: 1 = END. This distinguishes it from another Entity Input, for which this entry would be blank (negative zero).